

IN THE UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF MONTANA  
BUTTE DIVISION

UNITED STATES OF AMERICA AND )  
THE STATE OF MONTANA, )

Plaintiffs, )

v. )

Civil Action No. CV 89-039-BU-SEH

ATLANTIC RICHFIELD COMPANY )  
and The City and County of BUTTE- )  
SILVER BOW, a Municipal Corporation )  
And Political Subdivision of the State of )  
Montana, )

Defendants. )

**CONSENT DECREE  
FOR THE BUTTE PRIORITY SOILS OPERABLE UNIT  
PARTIAL REMEDIAL DESIGN/REMEDIAL ACTION and OPERATION AND  
MAINTENANCE**



# TABLE OF CONTENTS

	<u>Page</u>
I. BACKGROUND.....	1
II. JURISDICTION.....	13
III. PARTIES BOUND.....	14
IV. DEFINITIONS .....	15
V. GENERAL PROVISIONS .....	34
VI. PAYMENT OF RESPONSE COSTS .....	39
VII. PERFORMANCE OF THE WORK BY THE SETTLING DEFENDANTS.....	55
VIII. PERFORMANCE OF THE BTC RIPARIAN ACTIONS BY DEQ .....	60
IX. REMEDY REVIEW .....	66
X. QUALITY ASSURANCE, SAMPLING, AND DATA ANALYSIS .....	69
XI. ACCESS AND INSTITUTIONAL CONTROLS.....	71
XII. FINANCIAL ASSURANCE.....	77
XIII. INDEMNIFICATION AND INSURANCE .....	85
XIV. FORCE MAJEURE .....	89
XV. DISPUTE RESOLUTION .....	92
XVI. STIPULATED PENALTIES .....	99
XVII. COVENANTS AND RESERVATIONS BY THE UNITED STATES AND THE STATE .....	106
XVIII. COVENANTS AND RESERVATIONS BY SETTLING DEFENDANTS AND SFAS .....	125
XIX. EFFECT OF SETTLEMENT; CONTRIBUTION PROTECTION .....	137
XX. ACCESS TO INFORMATION .....	140
XXI. RETENTION OF RECORDS .....	142
XXII. NOTICES AND SUBMISSIONS .....	144
XXIII. RETENTION OF JURISDICTION .....	147
XXIV. APPENDICES .....	147
XXV. EFFECTIVE DATE .....	148
XXVI. MODIFICATION .....	148
XXVII. LODGING AND OPPORTUNITY FOR PUBLIC COMMENT .....	149
XXVIII. SIGNATORIES / SERVICE.....	149



## **I. BACKGROUND**

### The United States' Complaint

A. In 1989, the United States of America (“United States”), on behalf of the Administrator of the United States Environmental Protection Agency (“EPA”), filed a complaint (the “Complaint”) in this matter (the “Federal Action”) pursuant to Section 107 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, (“CERCLA”), 42 U.S.C. § 9607, against the Atlantic Richfield Company (“AR”).

B. In the Complaint, which was subsequently amended on October 14, 1992, October 31, 1994, August 2, 2003, and November 5, 2004, the United States sought to recover its past response costs together with accrued interest and a declaratory judgment on liability for future response costs paid and incurred at or in connection with the Original Portion of the Silver Bow Creek / Butte Area National Priorities List (“NPL”) Site, the Milltown Reservoir Sediments NPL Site (now referred to as the “Milltown Reservoir / Clark Fork River NPL Site”), and the Anaconda Smelter NPL Site. The November 5, 2004 amendment added to the Complaint an area known as the Butte Priority Soils Operable Unit (“BPSOU”). The BPSOU is the focus of this Consent Decree.

C. In response to the United States' Complaint, AR asserted several defenses and filed counterclaims against the United States, naming several Settling Federal Agencies (“SFAs”), seeking cost recovery, contribution, contractual indemnity, equitable indemnification, recoupment, and declaratory relief. Among AR's defenses to the United States' claims is AR's assertion that the United States' CERCLA claims are in the nature of contribution under CERCLA § 113 rather than CERCLA § 107, and thus AR's CERCLA liability is several rather



than joint and several. This defense is addressed in a Report and Recommendation issued by the Magistrate in this case.

D. The United States is filing, contemporaneously with the lodging of this Consent Decree, an amended complaint to name the City and County of Butte Silver Bow (“BSB”) as a potentially responsible party for the BPSOU under Section 107 of CERCLA, 42 U.S.C. § 9607.

E. The State of Montana (the “State”), acting by and through the Montana Department of Environmental Quality (“DEQ”), has filed a motion to intervene and a complaint in intervention in the Federal Action. The State’s amended complaint alleges claims under CERCLA and the Montana Comprehensive Environmental Cleanup and Responsibility Act (“CECRA”), §§ 75-10-701, MCA, et seq. relating to the BPSOU. The State’s claims are expressly limited to the BPSOU and the matters addressed in the Consent Decree. The United States, AR, and BSB agree and the Court finds by entering this Consent Decree that the State’s waiver of sovereign immunity is solely limited to the matters set forth in the State’s complaint in intervention and this Consent Decree, and includes the State’s waiver of sovereign immunity and consent to this Court’s jurisdiction for resolution of any reserved claim brought by AR under Paragraph 96.f (Restoration Reservation).

#### Settlement Framework

F. In November of 1998, the United States and AR reached a settlement regarding the response claims of the United States at the Streamside Tailings Operable Unit, which is part of the Silver Bow Creek / Butte Area NPL Site. The Streamside Tailings consent decree, together with a consent decree entered in the case of *Montana v. Atlantic Richfield*, a related case, both of which were entered on April 19, 1999, also resolved the majority of the Clark Fork River Basin natural resource damages claims of the United States and the State against AR. The



Streamside Tailings consent decree also established a framework for resolving the United States' remaining claims throughout the Clark Fork River Basin in Montana. Under Section VII of the Streamside Tailings consent decree, the parties agreed to resolve the remaining areas in six groups or "baskets" of operable units:

1. Rocker Site;
2. Butte Mine Flooding (Berkeley Pit) Site and the Butte Active Mining Area Site;
3. Anaconda Smelter NPL Site;
4. Clark Fork River Operable Unit, Warm Spring Ponds Operable Units, and the Milltown Reservoir Operable Units;
5. Butte Priority Soils Operable Unit (towns of Butte and Walkerville); and
6. The West Side Soils Operable Unit, formerly referred to as the Non-Priority Soils Operable Unit (rural Butte), as described in paragraph 31(F) of the Streamside Tailings consent decree (which states EPA would follow notice and negotiations procedures under Section 122 of CERCLA, 42 U.S.C. § 9622, for the West Side Soils Operable Unit).

The United States, the State and AR have already successfully concluded their negotiations for the Rocker, Butte Mine Flooding, Milltown Reservoir and Clark Fork River sites. This Court entered the Rocker Site consent decree in November of 2000, the Butte Mine Flooding Site consent decree in August of 2002, the Milltown Site consent decree in February of 2006, and the Clark Fork River consent decrees in August of 2008 (the Clark Fork River consent decree also addressed remaining State and federal natural resource damage claims against AR).

G. In addition, the United States and AR negotiated a consent decree entitled Consent Decree for Settlement of Remaining Sites Past Response Costs that was entered by this Court on January 24, 2005 ("Past Costs Consent Decree"). The Past Costs Consent Decree addressed response costs incurred responding to hazardous substance contamination at certain Operable Units known as the so-called "Remaining Sites," defined in that consent decree as the Anaconda Smelter NPL Site, the Butte Priority Soils Operable Unit, the Clark Fork River



Operable Unit, and the Warm Springs Ponds Operable Units. It provided, *inter alia*, for reimbursement of EPA costs paid through July 31, 2002, and the United States Department of Justice (“DOJ”) costs incurred through October 7, 2002 (the subsequent Clark Fork River Operable Unit Consent Decree settled DOJ costs through April 28, 2007, and certain EPA costs) pursuant to Section 107 of CERCLA, 42 U.S.C. § 9607. The Past Costs Consent Decree also resolved, subject to AR’s reservations found in Paragraph 20 of the Past Costs Consent Decree, all counterclaims and most defenses asserted by AR against the United States in this action, and addressed related covenants and reservations for the “Remaining Sites” as defined in that Consent Decree. Paragraph 20 of the Past Costs Consent Decree reserved certain specific counterclaims and defenses for AR relating to the BPSOU. This Consent Decree resolves those reserved counterclaims and defenses, subject to the reservations of the Parties concerning the BPSOU that are set forth in Sections XVII (Covenants and Reservations by the United States and the State) and Section XVIII (Covenants and Reservations by the Settling Defendants and SFAs) of this Consent Decree.

H. In September of 2013, this Court also entered a consent decree resolving certain of the United States’ past response cost claims against AR relating to Anaconda Smelter Site and the Warm Springs Ponds operable units (the “Interim Past Costs Consent Decree”). The Interim Past Costs Consent Decree did not further address the BPSOU, but did resolve the United States’ claims for DOJ costs incurred in litigating the Federal Action from April 29, 2007, through December 31, 2010.

I. The Streamside Tailings consent decree describes the baskets of operable units to be negotiated in the order described above, but it also provides the parties with flexibility to



change this order. Consistent with this flexible framework, the United States, the State and AR commenced negotiations to next address the BPSOU, rather than the Warm Springs Ponds operable units or the Anaconda Smelter Site. Concurrently with these discussions, the United States and the State also commenced negotiations regarding the BPSOU with BSB, Inland Properties, Inc., RARUS Railway LLC (“RARUS”), Union Pacific Railroad Company (“UP”), and BNSF Railway Company (“BNSF”), who, among others, have also been named by EPA as potentially responsible parties under Section 107 of CERCLA, 42 U.S.C. § 9607, for the BPSOU, based on the current and past ownership and/or operation of certain facilities at or from which a release or substantial threat of release of Hazardous Substances occurred or is occurring within the BPSOU. Inland, RARUS, UP and BNSF are not parties to this Consent Decree but may be parties to subsequent consent decrees or administrative orders addressing BPSOU.

J. The parties to this Consent Decree agree to resolve in this Consent Decree:

1. The United States’ claims against AR and BSB (the “Settling Defendants”) concerning liability for future and ongoing response actions at the BPSOU, including the design and implementation of the Remedial Action and subsequent Operation and Maintenance at the BPSOU, subject to the Parties’ reservations that are set forth in Section XVII (Covenants and Reservations by the United States and the State) and Section XVIII (Covenants and Reservations by the Settling Defendants and SFAs) of this Consent Decree;

2. The United States’ claims against the Settling Defendants for response costs relating to the BPSOU paid by EPA after July 31, 2002, including: (a) interim response costs incurred by EPA at the BPSOU; (b) interim response costs paid by EPA that EPA has allocated to the BPSOU from the Silver Bow Creek / Butte Area NPL Site-wide account and a



general account covering all of the named sites within the Clark Fork River Basin; (c) future response costs, including allocated costs, to be paid by EPA at the BPSOU; and (d) past costs incurred by the DOJ from January 1, 2011, through September 30, 2016, in pursuing the claims filed in the Complaints in this action;

3. The State's claims against the Settling Defendants for past, interim, and future response costs and for future response actions relating to the BPSOU, subject to the Parties' reservations that are set forth in Section XVII (Covenants and Reservations by the United States and the State) and Section XVIII (Covenants and Reservations by the Settling Defendants and SFAs) of this Consent Decree; and

4. Subject to the Parties' reservations that are set forth in Section XVIII (Covenants and Reservations by the Settling Defendants and SFAs) of this Consent Decree, the Settling Defendants' reserved defenses and counterclaims that have been asserted or could be asserted against the United States and/or the State relating to response costs or response actions at the BPSOU.

The Butte Priority Soils Operable Unit

K. Butte, Montana was the site of mining, milling and smelting activities from the 1860s to the present. In response to the release and threatened release of Hazardous Substances from facilities in and around Butte and Anaconda, Montana, EPA placed the original Silver Bow Creek Superfund Site on the NPL by publication in the Federal Register on September 8, 1983, 48 Fed. Reg. 40658, pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605. The original listing of the Silver Bow Creek Superfund Site focused on contamination within and along Silver Bow Creek from the confluence of Silver Bow Creek and Blacktail Creek in Butte through the Warm Springs Ponds, approximately 28 miles downstream from the headwaters. The original Silver



Bow Creek Superfund Site was amended on July 22, 1987, 52 Fed. Reg. 27627, to include large areas in and around Butte, and is now known as the Silver Bow Creek / Butte Area Superfund Site (“SBCB”). This addition is known as the Butte portion of SBCB, and includes the area later designated as the BPSOU. As noted earlier, the BPSOU is the focus of this Consent Decree.

L. The extensive mining, milling, and smelting activities that occurred within the BPSOU included over 300 mines (which produced contaminated overburden and other wastes), over 19 mills and smelters (which produced tailings, fines, and other contaminated wastes), and an extensive network of railroad beds and lines (some of which were created with contaminated materials in some areas and which received spills of contaminated concentrate and waste in some areas). At least 197 contaminated source areas, or facilities, were created from these operations within the BPSOU. Aerial emissions from the mills and smelters contributed to the spread of contamination throughout the BPSOU, including residences, yards, and business locations within and adjacent to the BPSOU. Stormwater is impacted by run-off from the source areas and Railroad Properties, which contributes to the spread of Hazardous Substances throughout the BPSOU, including the alluvial groundwater aquifer, Blacktail Creek and Silver Bow Creek. The stormwater conveyance system within the BPSOU is a source of continuing contaminated storm water discharges to lower Silver Bow Creek. All of these mechanisms contributed to the release or substantial threat of release of Hazardous Substances in and from the BPSOU. Naturally occurring metals and arsenic are also present within the BPSOU, which has resulted in contributions of metals and arsenic to stormwater, surface water, soils, and groundwater in BPSOU, although the Parties disagree as to the extent of such contributions.



M. After conducting other data collection and liability searches, and in response to the release or substantial threat of release of Hazardous Substances in and from the BPSOU, EPA, in consultation with the DEQ, initiated a series of removal actions at the BPSOU beginning in 1988. The list of those removal actions is as follows, with EPA administrative order numbers indicated where potentially responsible parties performed all or part of the work:

1. Walkerville Time Critical Removal Action (TCRA) I (1988) (Order No. CERCLA-VIII-88-05);

2. Timber Butte TCRA (1989) (Order No. CERCLA-VIII-89-21);

3. BPSOU TCRA (1990 and 1991) (Orders No. CERCLA-VIII-90-11 and CERCLA-VIII-90-12);

4. BPSOU EE/CA Administrative Order on Consent (Order No. CERCLA-VIII-91-13);

5. Colorado Smelter TCRA (1992) (Order No. CERCLA-VIII-92-04);

6. Anselmo Mine Yard and Late Acquisition / Silver Hill TCRA (1992) (Order No. CERCLA-VIII-92-23);

7. Walkerville TCRA II (1994) (EPA performed);

8. Railroad Beds TCRA (2000 to the present) (Order No. CERCLA-VIII-2000-02);

9. Stormwater TCRA (1995 to the present) (Order No. CERCLA-VIII-95-58);

10. Walkerville TCRA III (2000) (EPA performed);



11. Lower Area One EE/CA Administrative Order on Consent (Order No. CERCLA-VIII-90-14);

12. Lower Area One Non-Time Critical Removal Action (NTCRA) (1992 to the present) (Order No. CERCLA-VIII-92-17);

13. Manganese TCRA (1992) (EPA performed); and

14. BPSOU Residential Soils / Waste Dumps NTCRA (1994 to the present) (Order No. CERCLA-VIII-94-21).

In addition, EPA and AR participated in the following associated actions:

1. Clark Tailings RCRA action (1998); and

2. Mine Flooding related pump vault interceptor (2002).

N. In 1992, certain potentially responsible parties conducted a Remedial Investigation and Feasibility Study (“RI/FS”) for the BPSOU in accordance with 40 C.F.R. § 300.430 and Administrative Order on Consent Docket No. CERCLA-VIII-92-18. The RI/FS was completed in 2004. The BPSOU RI/FS, as well as a subsequent supplemental focused feasibility report, examined alternatives for final remedial actions at the BPSOU.

O. In December of 2004, EPA, in consultation with DEQ, analyzed the various remedial action alternatives and proposed what it deemed to be the most appropriate remedy for the BPSOU and adjacent residential areas in a Proposed Plan (“2004 Proposed Plan”). Pursuant to Section 117 of CERCLA, 42 U.S.C. § 9617, EPA published notice of the 2004 Proposed Plan in a major local newspaper of general circulation. It then provided an opportunity for written and oral comments from the public on the 2004 Proposed Plan. A copy of the transcript of public meetings on the 2004 Proposed Plan is available to the public as part of the administrative



record upon which the EPA Regional Administrator's delegate based the selection of the response actions for the BPSOU in 2006.

P. On September 25, 2006, EPA issued a Record of Decision ("2006 Record of Decision") establishing the remedial action to be implemented at the BPSOU and published notice of the decision in a major local newspaper of general circulation in accordance with Section 117(b) of CERCLA, 42 U.S.C. § 9617(b). The 2006 Record of Decision contains a responsiveness summary to the public comments received on the 2004 Proposed Plan. Certain portions of the BPSOU remedy were then implemented under various existing orders described above. After the receipt of new information and other considerations, on July 18, 2011, EPA issued an Explanation of Significant Differences ("2011 ESD"), which modified the 2006 Record of Decision and described changes to the residential and non-residential remedial requirements, as well as the ground water monitoring requirements, of the 2006 Record of Decision. The 2011 ESD was followed on July 20, 2011, by EPA's issuance of a unilateral administrative order, EPA Docket No. CERCLA-08-2011-0011, pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606, for partial remedial design/remedial action and certain operation and maintenance activities at the BPSOU. On April 11, 2019, pursuant to Section 117 of CERCLA, 42 U.S.C. § 9617, EPA published notice of a Proposed Plan ("2019 Proposed Plan") to further amend the 2006 Record of Decision in a major local newspaper of general circulation. EPA provided an opportunity for written and oral comments from the public on the 2019 Proposed Plan. A copy of the transcript of public meetings on the 2019 Proposed Plan is available to the public as part of the administrative record upon which the EPA Administrator issued a BPSOU Record of Decision Amendment in 2020. On February 4, 2020, after



considering the public comments and other information in the administrative record, EPA issued a Record of Decision Amendment (“2020 Record of Decision Amendment”) further modifying the 2006 Record of Decision, to provide for, among other things, certain changes in surface water standards within the BPSOU and to further define certain remedial requirements at the BPSOU and residential areas outside the BPSOU, but within Silver Bow County. The 2020 Record of Decision Amendment includes a responsiveness summary to the public comments received on the 2019 Proposed Plan. Notice of the 2020 Record of Decision Amendment was published in accordance with Section 117(b) of CERCLA, 42 U.S.C. § 9617(b).

Q. The 2006 Record of Decision as modified by the 2011 ESD and the 2020 Record of Decision Amendment embodies EPA’s decision for the response actions to be implemented at the BPSOU. The 2006 Record of Decision, the 2011 ESD, and the 2020 Record of Decision Amendment are attached as Appendix A to this Consent Decree. DEQ had a reasonable opportunity to review and comment on the 2006 Record of Decision and gave its partial concurrence thereto on behalf of the State. DEQ also partially concurred on the 2011 ESD and concurred on the 2020 Record of Decision Amendment.

R. Based on information presently available to EPA and DEQ, EPA and DEQ believe that the Work and the BTC Riparian Actions will be properly and promptly conducted by the Settling Defendants and the State, respectively, if conducted in accordance with this Consent Decree and its appendices.

S. Solely for the purposes of Section 113(j) of CERCLA, the Remedy set forth in the 2006 Record of Decision, the 2011 ESD, and the 2020 Record of Decision Amendment, the response actions required to date of the Settling Defendants, the Work to be performed by the



Settling Defendants and the BTC Riparian Actions to be performed by DEQ shall constitute response actions taken or ordered by the President for which judicial review shall be limited to the administrative record.

Notice

T. In accordance with the NCP and Section 121(f)(1)(F) of CERCLA, 42 U.S.C. § 9621(f)(1)(F), EPA notified DEQ of negotiations with the Settling Defendants regarding the BPSOU. EPA also provided DEQ, on behalf of the State, with an opportunity to participate in such negotiations and to be a party to this Consent Decree. DEQ has since participated in these negotiations, and the State is a party to this action and a signatory to this Consent Decree.

U. In accordance with Section 122(j)(1) of CERCLA, 42 U.S.C. § 9622(j)(1), EPA notified the Department of the Interior, the State and the Confederated Salish and Kootenai Tribes (“Tribes”) of negotiations with a potentially responsible party regarding the release of Hazardous Substances relating to the BPSOU that may have resulted in injury to natural resources under federal, State, and/or the Tribes’ trusteeship. DOI and the Tribes did not participate in these negotiations and are not signatories to this Consent Decree, as they had previously resolved their natural resource damages claims at the BPSOU against AR, subject to certain reservations. The State as Trustee did participate in these negotiations and is a party to this action and a signatory to this Consent Decree.

No Admission of Liability

V. By entering into this Consent Decree, AR, BSB, the United States, and the State (the “Parties”) do not admit to any liability arising out of the transactions or occurrences either that were alleged, or could have been alleged, in the complaints, amended complaints, or counterclaims filed in the Federal Action. In addition, the Settling Defendants do not admit or



acknowledge that any alleged release or threatened release of Hazardous Substances at or from the BPSOU constitutes an imminent or substantial endangerment to the public health or welfare or the environment. The SFAs do not admit any liability arising out of the transactions or occurrences alleged in any counterclaim asserted by AR. The form of this Consent Decree (which is related to the prior consent decrees entered in the Federal Action) and the interpretation of certain legal requirements supporting the Work are unique to the site-specific circumstances occurring at the BPSOU and are not precedent for any other Consent Decree.

The Proposed Settlement

W. The Parties recognize, and the Court by entering this Consent Decree finds, that this Consent Decree has been negotiated by the Parties in good faith; that implementation of this Consent Decree will expedite the cleanup of the BPSOU and will avoid prolonged and complicated litigation between the Parties; and that this Consent Decree is fair, reasonable and in the public interest.

IT IS HEREBY ORDERED, ADJUDGED, AND DECREED AS FOLLOWS:

**II. JURISDICTION**

1. This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331, 1345 and 1367, and 42 U.S.C. §§ 9606, 9607 and 9613(b). In addition, this Court has personal jurisdiction over the Parties. Solely for the purposes of this Consent Decree and the underlying complaints, the Parties waive all objections and defenses that they may have to jurisdiction of the Court or to venue in this District. The Parties shall not challenge the terms of this Consent Decree or this Court's jurisdiction to enter and enforce this Consent Decree. Each Party hereby agrees not to oppose entry of this Consent Decree by this Court unless the



United States or the State has notified the other Parties in writing that it no longer supports entry of this Consent Decree after consideration of public comment, as provided in Section XXVII (Lodging and Opportunity for Public Comment) below.

### **III. PARTIES BOUND**

2. This Consent Decree is binding upon the United States, the State, AR and its successors and assigns, and BSB. Any change in ownership or corporate status or other legal status of AR, including, but not limited to, any transfer of assets or real or personal property, shall in no way alter AR's responsibilities under this Consent Decree. Any change in the status of BSB, including, but not limited to, any transfer of assets or real or personal property, shall in no way alter BSB's responsibilities under this Consent Decree. AR and BSB are hereinafter referred to collectively as the "Settling Defendants."

3. Each Settling Defendant shall provide a copy of this Consent Decree to each contractor hired by that Settling Defendant to perform the Work (as defined below) or any portion of the Work required by this Consent Decree and to each person representing that Settling Defendant with respect to the BPSOU or the Work. Each Settling Defendant shall also condition all contracts entered into hereunder upon performance of the Work in conformity with the terms of this Consent Decree. The Settling Defendants or their respective contractors shall provide written notice of the Consent Decree to all subcontractors hired by that Settling Defendant or its contractor to perform any portion of the Work required by this Consent Decree. The Settling Defendants shall nonetheless be responsible for ensuring that their respective contractors and subcontractors perform the Work contemplated herein in accordance with this Consent Decree. With regard to the activities undertaken pursuant to this Consent Decree, each contractor and subcontractor shall be deemed to be in a contractual relationship with the Settling



Defendant with which it has contracted, within the meaning of Section 107(b)(3) of CERCLA, 42 U.S.C. § 9607(b)(3). DEQ shall conduct all BTC Riparian Actions in accordance with this Paragraph.

#### **IV. DEFINITIONS**

4. Unless otherwise expressly provided herein, terms used in this Consent Decree that are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Consent Decree, or in the appendices attached hereto and incorporated herein, the following definitions shall apply:

“ARAR” shall mean an applicable or relevant and appropriate requirement, criterion, standard, or limitation of federal or state law within the meaning of Section 121(d)(2) of CERCLA, 42 U.S.C. § 9621(d)(2), identified in the ROD.

“AR” shall mean the Defendant, Atlantic Richfield Company, its divisions and subsidiaries, including ARCO Environmental Remediation L.L.C. (AERL), and any predecessors in interest. It shall also mean any successors in interest to the extent that any such successor’s liability at the BPSOU derives from the liability of the Atlantic Richfield Company, its divisions and subsidiaries, including AERL, and any predecessors in interest.

“BTC Riparian Actions” shall mean the Blacktail Creek remedial elements that DEQ, on behalf of the State, will complete, as described in Appendix H and the Blacktail Creek Remediation and Contaminated Groundwater Hydraulic Control Further Remedial Elements description, SOW Attachment C, Section 5 (except the groundwater remedy elements which Settling Defendants will complete), including the removal of sediments from Silver Bow Creek (east of Montana Avenue to the confluence of Silver Bow Creek and Blacktail Creek) and



Blacktail Creek. The State, through DEQ, will similarly remove tailings, waste, and contaminated soils and reconstruct Blacktail Creek and Silver Bow Creek and its 100-year floodplain in the “Confluence Area” north of George Street and east of Montana Avenue as shown in the Blacktail Creek Remediation and Contaminated Groundwater Hydraulic Control Further Remedial Elements description, SOW Attachment C, Section 5 and Figure BTC-1. Confluence Area work will be included in the activities DEQ will conduct in the BTC, and is part of the BTC construction project. The Blacktail Creek and Confluence Area activities are on-site and will be completed as remedy or restoration integrated with remedy under EPA oversight and are described further in Appendix H to this Consent Decree.

“BTC Riparian Actions Performance Standards” shall mean the construction performance standards that DEQ will attain in conducting the BTC Riparian Actions, including the reclamation and revegetation ARARs and quantitative measures of vegetation performance, as further outlined in Appendix H. The BTC Riparian Actions Performance Standards do not include the groundwater or in-stream surface water ARAR standards.

“BTC Riparian Action Remedial Action Work Plans” shall mean, for purposes of this Consent Decree, the documents described in the Appendix H or developed pursuant to this Consent Decree which detail the implementation plans for the BTC Riparian Actions, and any amendments thereto, as approved by EPA in accordance with this Consent Decree.

“Butte Area One Restoration Plan” or “BAO Plan” shall mean the document prepared by the State, and any amendments thereto adopted by the State, entitled the “Butte Area One Restoration Plan,” describing natural resource restoration actions implemented or to be implemented at the BPSOU. Prior to the December 2016 Butte Area One Restoration Plan



Amendment for the Parrot Tailings Waste Removal, the most recent version of this plan is dated January 8, 2014.

“BSB” shall mean the City and County of Butte Silver Bow, a municipal corporation and political subdivision of the State of Montana.

“Butte Priority Soils Operable Unit” or “BPSOU” shall mean the Butte Priority Soils Operable Unit, the surface area and surface boundary of which is shown on Appendix B. The BPSOU includes: the surface area as defined in the 2006 Record of Decision as modified in the 2020 Record of Decision Amendment; the portions of Silver Bow Creek and Blacktail Creek that run through the area shown in Appendix B; the Granite Mountain Memorial Interpretive Areas shown in Appendix B; and the alluvial groundwater that contains Hazardous Substances originating from the various facilities and sources that are within the BPSOU. The BPSOU does not include (1) the Butte Mine Flooding Site, as defined in the Butte Mine Flooding Site consent decree, CV 02-35-BU-RFC, entered in August of 2002; (2) the Butte Active Mine Area Site, as defined in the Response Decision Document attached to the Butte Mine Flooding Site consent decree as appendix B to that document and as amended in the Response Decision Deferral Document issued by EPA and DEQ in 2001; (3) the West Side Soils operable unit, the boundaries of which have not been defined; or (4) the Montana Pole and Treating Plant Site, as defined in the Montana Pole and Treating Plant Site consent decree, CV 90-75-BU-SEH, entered in July 1996.

“BPSOU Account” shall mean the account created and managed by the State Board of Investments pursuant to Paragraphs 20 and 21 of the CD.



“CECRA” shall mean the Montana Comprehensive Environmental Cleanup and Responsibility Act, as amended, §§ 75-10-701 et seq., MCA.

“CERCLA” shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601 et seq.

“Certification of Completion of the Remedial Action” shall mean EPA’s certification, in consultation with the State, pursuant to Section 122(f)(3) of CERCLA, 42 U.S.C. § 9622(f)(3), that the Remedial Action and any modifications thereto have been completed at the BPSOU in accordance with the requirements of CERCLA, the NCP, and the ROD, including certification that Performance Standards have been attained or that the requirements of Paragraph 4.7 of the SOW otherwise have been satisfied.

“CFRSSI LAP” shall mean the Clark Fork River Superfund Site Investigations Laboratory Analytical Protocol (AR/PTI, April 1992), as subsequently amended as of the Effective Date, or alternative laboratory analytical protocols approved by EPA in consultation with DEQ for use in place of the CFRSSI LAP.

“CFRSSI QAPP” shall mean the Clark Fork River Superfund Site Investigations Quality Assurance Project Plan (AR/PTI and EPA, May 1992), as subsequently amended as of the Effective Date, or alternative quality assurance plans approved by EPA in consultation with DEQ for use in place of the CFRSSI QAPP.

“Clark Fork Site Consent Decrees” shall mean the consent decrees entered in this Federal Action and in the State Action on August 21, 2008, resolving, inter alia, the response action claims of the United States at the Clark Fork Site; and natural resource damages claims of the



United States at the Clark Fork Site; and the natural resource damages claims of the State at the Clark Fork Site, the Anaconda Site and the BPSOU.

“Clark Fork NPL Sites” shall mean the Anaconda Smelter Site, the Silver Bow Creek/Butte Area Site, the Milltown Reservoir/Clark Fork River Site and the Montana Pole and Treating Plant Site.

“Continuation of Existing Migration” shall mean the downstream movement of contamination from and through the BPSOU after the Settling Defendants have obtained KRECCR approval and at all times when Settling Defendants are in compliance with relevant O&M and other obligations under this Consent Decree and its attachments. “Continuation of Existing Migration” of Hazardous or Deleterious Substances as defined within this Consent Decree has the same meaning as within the Streamside Tailings Operable Unit and Federal and Tribal Natural Resource Damages Consent Decree entered in the Federal Action in 1999 (SST CD, Paragraph 7.ss.i).

“Consent Decree” or “CD” shall mean this Consent Decree and all appendices attached hereto. In the event of conflict between this Consent Decree and any appendix, this Consent Decree shall control.

“Cost Documentation” shall mean a cost package for EPA’s costs which consists of applicable: (1) payroll information, consisting of the SCORPIO\$ report or an equivalent cost summary, and any time sheets that exist, if requested by AR; (2) indirect cost information, consisting of an overall and an employee-by-employee SCORPIO\$ report or equivalent cost summary; (3) travel information, consisting of a SCORPIO\$ report or an equivalent cost summary, travel authorizations, and travel vouchers or their equivalent that exist; (4) EPA



contractor (including Contract Laboratory Program contracts) information, consisting of site and/or Operable Unit specific vouchers, any existing progress reports, Treasury schedules, tasking documents for contractors not required to provide progress reports, Annual Allocation Reports and the SCORPIO\$ report or an equivalent cost summary; (5) EPA Interagency Agreements (“IAGs”) information, consisting of SCORPIO\$ reports or an equivalent cost summary, IAGs and any amendments thereto, invoices or the equivalent, proof of payment documents, and any existing progress reports or their equivalent; (6) EPA Cooperative Agreements information, consisting of SCORPIO\$ reports or an equivalent cost summary, cooperative agreements and any amendments thereto, drawdown documentation, State quarterly progress reports; (7) prejudgment interest information, consisting of an interest cost report showing methodologies and calculations; and (8) Operable Unit allocated cost information, consisting of a narrative of allocation methodologies and spreadsheets implementing such methodologies. Because the State has incurred costs and may continue to incur costs under cooperative agreements with EPA which relate to or are allocated to the BPSOU, Cost Documentation, if requested by the Settling Defendants, shall also include: (a) State contractor invoices; (b) any existing contractor progress reports; and (c) SABHRS Report 106 information (if not included in the State quarterly progress reports) or its equivalent. EPA may also provide the information described in the foregoing list of “Cost Documentation” in the form of printouts from electronic databases or systems that have been developed or may be developed by EPA in the future. “Cost Documentation” for response costs incurred by the Department of Justice shall consist of a cost summary of: (a) direct labor costs; (b) other direct costs (invoices, travel, etc.);



and (c) indirect costs, and upon request by AR, shall also consist of the supporting reports for each of these three types of Department of Justice costs.

“Day” shall mean a calendar day. In computing any period of time under this Consent Decree, where the last day would fall on a Saturday, Sunday, or State of Montana or Federal holiday, the period shall run until the close of business of the next working day.

“DEQ” shall mean the Montana Department of Environmental Quality and any predecessor or successor departments or agencies of the State.

“DOJ” shall mean the United States Department of Justice and any successor departments or agencies.

“Earnings” shall mean the net earnings on the principal paid into the BPSOU Account and compounded on the BPSOU Account as managed by the State Board of Investments or any successor agency, and any Interest paid by AR pursuant to Paragraph 20.h.

“Effective Date” shall mean 60 days from the date that this District Court enters the Consent Decree, unless an appeal of the entry and judgment is filed during the 60-day period; if an appeal is taken, the Effective Date shall mean the date on which the District Court’s judgment is affirmed.

“EPA” shall mean the United States Environmental Protection Agency and any successor departments or agencies.

“EPA Site Record” shall mean the files maintained in EPA’s Montana Office records center (located in Helena) for the BPSOU that are neither privileged nor confidential and that are not contained within the administrative record for the BPSOU.



“Federal Action” shall mean *United States v. Atlantic Richfield Company et al.*, No. CV-89-039-SEH (D. Mont.).

“Federal BPSOU Future Response Costs” shall mean all response costs (excluding Oversight Costs for the BPSOU) that the United States incurs after the Effective Date relating to the BPSOU, including but not limited to direct and indirect costs that the United States pays, and the State pays through funding from the United States pursuant to a cooperative agreement, in reviewing or developing plans, reports, and other items pursuant to this Consent Decree, including but not limited to payroll costs, contractor costs, travel costs, laboratory costs, the costs paid pursuant to Sections IX (Remedy Review), XI (Access and Institutional Controls), Paragraph 4.4 of the SOW (Emergency Response and Reporting), and the work takeover provisions of Section XVII (Covenants and Reservations of the United States and the State) of this Consent Decree; and including allocable Clark Fork General and Silver Bow Creek/Butte Area site wide costs. Section VI (Payment of Response Costs) of this Consent Decree requires the Settling Defendants to reimburse EPA for all of its Federal BPSOU Future Response Costs relating to the BPSOU, including Federal BPSOU Future Response Costs paid by EPA to the State (including DEQ) under cooperative agreement. Federal BPSOU Future Response Costs shall not include Oversight Costs for the BPSOU, as that term is defined in this Consent Decree, whether paid by EPA either directly or through a cooperative agreement with the State (including DEQ). Federal BPSOU Future Response Costs shall also not include funds for BTC Riparian Actions, State Restoration, or end land use activities described in the SOW (Addendum 1 to SOW Attachment C).



“Federal BPSOU Interim Response Costs” shall mean all costs of response, including direct and indirect costs, as well as costs allocated from the Silver Bow Creek / Butte Area site-wide account and the Clark Fork General account, that are: (a) paid by EPA at or in connection with the BPSOU (including RMAP-related costs) after July 31, 2002, through the Effective Date; (b) incurred by EPA at or in connection with the BPSOU (including RMAP-related costs) through the Effective Date, but paid by EPA after that date; or (c) incurred or paid by DOJ relating to the Federal Action from January 1, 2011, through September 30, 2016, and any claim for interest accrued on such costs. Notwithstanding the foregoing, the Settling Defendants shall pay \$3,500,000 in full settlement of “Federal BPSOU Interim Response Costs” pursuant to Paragraph 12 (Settling Defendants Payment of Federal BPSOU Interim Costs) of this Consent Decree.

“Federal BPSOU Past Response Costs” shall mean all response costs, including but not limited to direct and indirect costs, that EPA paid at or in connection with the BPSOU through July 31, 2002, including, without limitation, oversight costs (including RMAP-related costs), allocable Clark Fork General and Silver Bow Creek / Butte Area Site-wide Costs, Interest on all such costs which accrued pursuant to 42 U.S.C. § 9607(a) through such date, and costs incurred by the State paid through funding from the United States pursuant to cooperative agreements.

“Hazardous Substance” shall mean a hazardous substance within the meaning of Section 101(14) of CERCLA, 42 U.S.C. § 9601(14), or a hazardous or deleterious substance within the meaning of Section 75-10-701(8), MCA.

“Indemnatee” shall mean Inland Properties, Inc. (“Inland”), in its capacity as an owner of record of real property in the BPSOU that it acquired in a chain of title with Atlantic Richfield



Company, after December 18, 1985, and prior to December 30, 1997, when Atlantic Richfield Company agreed to indemnify Inland for certain liabilities that are “matters addressed” in this Consent Decree. For purposes of this Consent Decree, “Indemnatee” refers to Inland, a corporation, and does not extend to: (i) its officers, directors, shareholders, employees, affiliates, subsidiary or parent, except to the extent of Inland’s potential liability as an owner of record of real property in BPSOU after December 18, 1985, and prior to October 16, 2019; or (ii) any entity that Inland may subsequently merge or consolidate with, exchange shares with, or acquire, or otherwise combine with in any manner, except to the extent of Inland’s potential liability as an owner of record of real property in BPSOU after December 18, 1985, and prior to October 16, 2019.

“Interest” on federal claims shall mean interest at the rate specified for interest on investments of the Hazardous Substance Superfund, compounded annually on October 1 of each year, in accordance with 42 U.S.C. § 9607(a). The applicable rate of interest shall be the rate in effect at the time the interest accrues. That rate of interest is subject to change on October 1 of each year. Rates are available online at [http://www.epa.gov/ocfpage/finstatement/superfund/int\\_rate.htm](http://www.epa.gov/ocfpage/finstatement/superfund/int_rate.htm).

“KRECCR” is the key remedial elements construction completion report, a deliverable required by and described in Paragraph 4.6(g) of the SOW, Appendix D.

“National Contingency Plan” or “NCP” shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, and any amendments thereto.

“NPL” shall mean the National Priorities List set forth at 40 C.F.R. Part 300, appendix B.



“Operable Unit” shall mean an area, geographic or otherwise, for which there is a response action, whether removal or remedial, that is subject to a separate administrative record and response selection decision.

“Operation and Maintenance” or “O & M” shall mean all activities performed by the Settling Defendants that are required to operate, maintain and monitor the effectiveness of Remedial Action as specified in the SOW or any EPA-approved O & M Plan to implement the SOW.

“Oversight Costs for the BPSOU” shall mean, for purposes of this Consent Decree only, those response costs incurred by EPA or the State (either as lead agency or support agency) after the Effective Date in monitoring and/or overseeing the development and implementation of the Work and the BTC Riparian Actions pursuant to the requirements of this Consent Decree, including costs incurred by EPA in consulting with the State and costs paid by EPA to the State under cooperative agreement, in reviewing plans, reports, and other documents submitted by the Settling Defendants pursuant to this Consent Decree, allocable Clark Fork General and Silver Bow Creek / Butte Area Site-wide costs, and costs incurred in conducting the reviews of the Remedy and any modifications thereto required by Section IX (Remedy Review) in accordance with Section IX (Remedy Review) and Section 121(c) of CERCLA after the Effective Date. Oversight Costs for the BPSOU also includes response costs incurred by EPA or the State after the Effective Date for oversight of RMAP. However, Oversight Costs for the BPSOU shall not include:

- (1) The costs of direct action by EPA and/or the State to respond to a release, threat of release, or danger at the BPSOU;



- (2) The costs of litigation or other enforcement activities relating to the BPSOU;
- (3) The cost of enforcing the terms of this Consent Decree against the Settling Defendants, including all costs incurred in connection with Dispute Resolution pursuant to Section XV (Dispute Resolution);
- (4) Costs of determining the need for, or taking, direct response actions by EPA and/or the State pursuant to: Section IX (Remedy Review) that are outside the scope of the remedy, Section XI (Access and Institutional Controls), Paragraph 4.4 of the SOW (Emergency Response and Reporting), and Section XVII (Covenants and Reservations by the United States and the State) of this Consent Decree, except that the following costs shall be included in the definition of Oversight Costs for the BPSOU:

- (A) The costs incurred by EPA and the State in overseeing additional response actions at the BPSOU that may be required pursuant to the five-year reviews of the Work;
- (B) The costs incurred by EPA and the State regarding the monitoring and/or overseeing of any additional response actions to be undertaken at the BPSOU pursuant to Paragraph 27 (Modification of SOW or Related Deliverables as to Settling Defendants' Work); and
- (C) The costs incurred by EPA and the State for any coordination of State Restoration with Remedial Action and Operation and Maintenance at the BPSOU, and in monitoring and/or overseeing such coordination.

“Paragraph” shall mean a portion of this Consent Decree identified by an Arabic numeral.



“Parrot Tailings Waste Removal” shall mean the activities described in the December 2016 Butte Area One Restoration Plan Amendment for the Parrot Tailings Waste Removal, any amendments thereto, and as implemented. For purposes of this Consent Decree only, the Parrot Tailings Waste Removal shall be considered State Restoration.

“Parties” shall mean the United States, the State, AR, and BSB.

“Past Costs Consent Decree” shall mean the Consent Decree entered in this Federal Action on January 24, 2005, which resolved certain of the United States’ past response cost claims against AR relating to the Anaconda Smelter NPL Site, the Butte Priority Soils Operable Unit including “Federal BPSOU Past Response Costs”, the Clark Fork River Operable Unit and the Warm Springs Ponds Operable Units.

“Performance Standards” shall mean the cleanup standards, levels and other measures of achievement of the remedial action objectives contained in the ROD, including ARARs. Appendix D (SOW) and Attachment A to Appendix D (BPSOU Surface Water Compliance Determination Plan) provide an explanation of how in-stream surface water Performance Standards are to be measured and addressed under this Consent Decree. The Parties acknowledge that the terms and conditions of the BPSOU Surface Water Compliance Determination Plan are site-specific to BPSOU and this Consent Decree and do not constitute precedent for other settlements involving the Parties at other sites. The Performance Standards in this definition are distinct from the BTC Riparian Actions Performance Standards.

“Plaintiffs” means the United States and the State of Montana.

“Railroad Properties” shall mean those facilities owned, operated, and/or controlled by the BNSF Railway Company and/or the Union Pacific Railroad Company, including their



divisions, subsidiaries, and any successors in interest, shown for illustrative purposes only in the map attached as Appendix F. Facilities owned and operated by RARUS are not Railroad Properties for purposes of this Consent Decree. If and to the extent that any real property parcel owned by BNSF Railway Company and/or Union Pacific Railroad Company is transferred to and a Settling Defendant becomes the record owner of said property after the Effective Date, such real property parcel will be thereafter excluded from Railroad Properties for purposes of this Consent Decree.

“RARUS” shall mean RARUS Railway, LLC, d/b/a Butte, Anaconda & Pacific Railway Company, a subsidiary of Patriot Rail Company, LLC.

“RCRA” shall mean the Solid Waste Disposal Act, as amended, 42 U.S.C. §§ 6901 et seq. (also known as the Resource Conservation and Recovery Act).

“Remaining Sites” for purposes of this Consent Decree shall mean the areas left to be settled under the April 19, 1999 Streamside Tailings Consent Decree settlement framework, as of the Effective Date of this Consent Decree; namely the Anaconda Smelter Site and the Warm Springs Ponds Operable Units including the Mill Willow Bypass. As noted above, the West Side Soils Operable Unit is not addressed under the Streamside Tailings Consent Decree framework and response action at the Butte Active Mining Area is currently deferred subject to State law regulation.

“Remedial Action” or “RA” shall mean those activities, except for Operation and Maintenance, that the Settling Defendants and the State have undertaken or will undertake as required under this Consent Decree and its attachments to implement the remedial action selected in the ROD (excluding the Residential Solid Media Remedial Action).



“Remedial Action Work Plans” shall mean, for purposes of this Consent Decree, the documents described in the SOW, and attached to the SOW or developed pursuant to this Consent Decree which detail the implementation plans for the Remedy, and any amendments thereto, as approved by EPA in accordance with this Consent Decree.

“Remedial Design” or “RD” shall mean those activities undertaken or to be undertaken to develop the final plans and specifications for the Remedial Action selected in the ROD. The Settling Defendants’ and the State’s Remedial Design commitments under this Consent Decree are defined in the SOW and Appendix H, respectively, and any amendments or modifications thereto, as provided in this Consent Decree.

“Remedy” shall mean the response actions at the BPSOU set forth in the ROD, including monitoring and oversight, Remedial Design, Remedial Action, and Operation and Maintenance (excluding the Residential Solid Media Remedial Action).

“Residential Solid Media Remedial Action,” for purposes of this Consent Decree, shall mean remedial actions to address residential exposures described in the 2006 Record of Decision, the 2011 ESD, and the 2020 Record of Decision Amendment. Remedial action to address such residential exposure is implemented, as of the Effective Date, through the Residential Metals Abatement Program (RMAP) on residential properties.

“ROD,” for purposes of this Consent Decree, shall mean the BPSOU Record of Decision signed on September 21, 2006, by the Assistant Regional Administrator for Ecosystems Protection and Remediation, EPA Region 8, and partially concurred on by the Director of the Montana Department of Environmental Quality on behalf of the State and all attachments, the 2011 ESD, the 2020 Record of Decision Amendment and all ESDs and nonsignificant/minor



modifications thereto, when effective. The 2006 Record of Decision, the 2011 ESD, and the 2020 Record of Decision Amendment are attached to this Consent Decree as Appendix A. The 2020 Record of Decision Amendment is effective on the Effective Date of this Consent Decree. The ROD, as defined for purposes of this Consent Decree only, does not include Residential Solid Media Remedial Action.

“Section” shall mean a portion of this Consent Decree identified by a Roman numeral.

“Settling Defendants” shall mean AR and BSB.

“Settling Federal Agencies” or “SFAs” shall mean the United States Department of Justice, the United States Department of the Interior, the United States Department of Treasury, the United States Department of Commerce, the United States Department of Agriculture, the United States Department of Agriculture Forest Service, the General Service Administration, the National Aeronautics and Space Administration, the United States Department of Defense, the United States Environmental Protection Agency, the United States Department of Health and Human Services, the United States Public Health Service, the Atomic Energy Commission, the Defense Minerals Exploration Administration, the Defense Minerals Administration, the Office of Minerals Exploration, and the Defense Minerals Procurement Agencies, any agencies, bureaus, or services of such entities, and any predecessor and successor departments, agencies, bureaus, or services of such entities.

“Source Area Property” shall mean any real property within the BPSOU where any source area or floodplain waste described in Section 5.2.2 (Non-Residential Soil/Waste Characterization) of the 2006 Record of Decision or this Consent Decree related to historic mining is located, including that real property identified as a “Source Area Property” in



Appendix G, and any other real property where EPA and DEQ determine, after providing notice and an opportunity to comment to the Settling Defendants, that any source area or floodplain waste described in Section 5.2.2 (Non-Residential Soil/Waste Characterization) of the 2006 Record of Decision is located, and which was not specifically identified as such in Appendix E or subject to future actions pursuant to the SOW, Appendix D.

“State” shall mean the State of Montana, including all of its departments, agencies, and instrumentalities. For purposes of this Consent Decree, “State” does not include Defendant BSB.

“State Action” shall mean *State of Montana v. Atlantic Richfield Company*, No. CV-83-317-HLN-SEH (D. Mont.).

“State BPSOU Future Response Costs” shall mean all response costs (excluding Oversight Costs for the BPSOU) that the State incurs after the Effective Date relating to the BPSOU, including but not limited to direct and indirect costs that the State pays in reviewing or developing plans, reports, and other items for Remedial Design and Remedial Action required by this Consent Decree, verifying the Work, or otherwise implementing, overseeing, or enforcing the Remedial Design and Remedial Action required by this Consent Decree, including but not limited to payroll costs, contractor costs, travel costs, laboratory costs, the costs incurred pursuant to Sections IX (Remedy Review), XI (Access and Institutional Controls), and Paragraph 4.4 of the SOW (Emergency Response and Reporting). Such costs are State BPSOU Future Response Costs if they are not reimbursed by EPA via cooperative agreement expenditures. Pursuant to the terms of the EPA-DEQ BPSOU Memorandum of Agreement, EPA shall endeavor to provide adequate federal funding to the State for all these activities. Section VI (Payment of Response Costs) of this Consent Decree requires the Settling Defendants to



reimburse the State for all of its State BPSOU Future Response Costs relating to the BPSOU. State BPSOU Future Response Costs shall not include Oversight Costs for the BPSOU, as that term is defined in this Consent Decree, costs for BTC Riparian Actions or Parrot Tailings Waste Removal costs and other costs related to State Restoration actions for the BPSOU.

“State Interest” shall mean interest at a rate of 4% compounded annually.

“State Restoration” shall mean the activities set forth in the BAO Restoration Plan, including the Parrot Tailings Waste Removal.

“State Site Record” shall mean the files for or related to the BPSOU that are maintained in the records center of DEQ, the Montana Bureau of Mines and Geology (MBMG), the Montana Department of Transportation or the Department of Natural Resources and Conservation (DNRC) and that are neither privileged nor confidential.

“Statement of Work” or “SOW” shall mean the document describing the activities the Settling Defendants must perform to implement the Remedial Design, Remedial Action and Operation and Maintenance. The SOW is attached to this Consent Decree as Appendix D, including its attachments and any amendments thereto, and is referenced as the “BPSOU SOW” throughout those documents. The SOW also includes reference to all final designs and work plans approved prior to lodging for Remedy implementation. The SOW, at Attachment C, Section 6 (Blacktail Creek Remediation and Contaminated Groundwater Hydraulic Control Remedial Elements description), also contains a description of BTC Riparian Actions that DEQ will perform (which excludes groundwater remedy elements that the Settling Defendants will complete). The BTC Riparian Actions are also described in Appendix H to the Consent Decree.



“Subdrain” shall mean the subdrain system as of the Effective Date, as shown on Appendix C (Figures of the Subdrain), and as it may be modified by Remedy implementation.

“Subparagraph” shall mean a portion of a Paragraph identified by an upper or lower case letter or by a lower case Roman numeral.

“Supervising Contractors” shall mean the principal contractors or Settling Defendant employees retained or utilized by the Settling Defendants, and the principal contractors or DEQ employees retained or utilized by the State, all as approved by EPA, in consultation with the DEQ, to supervise and direct the implementation of the Work or DEQ-designated activities under this Consent Decree.

“Superfund Memorandum of Agreement” or “SMOA” shall mean the agreement between EPA and the State which, in addition to the provisions of the Consent Decree, memorializes the manner in which the DEQ-designated activities will be performed by DEQ and overseen by EPA, among other issues. Only the State and the United States may enforce the terms of the SMOA. Nothing in this Consent Decree shall be deemed to create a right of any other party, including, but not limited to any Settling Defendant or any third party, against the State or the United States to enforce the terms of the SMOA.

“United States” shall mean the United States of America, including all of its departments, agencies, and instrumentalities.

“Waste Material” shall mean: (1) any “hazardous substance” under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); (2) any pollutant or contaminant under Section 101(33), 42 U.S.C. § 9601(33); (3) any “solid waste” under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27); and (4) any “hazardous or deleterious substance” under Section 75-10-701(8), MCA.



“Work” shall mean all activities the Settling Defendants are required to perform under this Consent Decree, including, without limitation, the Remedial Design, Remedial Action, Operation and Maintenance and emergency response actions undertaken pursuant to Paragraph 4.4 of the SOW (Emergency Response and Reporting); provided, however, that Work does not include those activities required under Section XXI (Retention of Records). Work also does not include the BTC Riparian Actions, State Restoration, Residential Solid Media Remedial Action (which is implemented through the RMAP as of the Effective Date), end land use actions described in the SOW (Addendum 1 to SOW Attachment C), and/or any activities on Railroad Properties.

## **V. GENERAL PROVISIONS**

5. Objectives of the Parties. The objectives of the Parties in entering into this Consent Decree are:

- a. To protect public health and welfare and the environment at the BPSOU through the design and implementation of response actions selected in the ROD, as provided for in this Consent Decree;
- b. To reimburse the United States for its past response costs, interim response costs, and the United States and the State for their future response costs, at the BPSOU, as provided in this Consent Decree;
- c. To resolve the response claims of the United States and the State against the Settling Defendants with regard to the BPSOU, as provided in this Consent Decree;
- d. To resolve the remaining claims and defenses of AR, and the claims and defenses of BSB, which have been or could have been asserted against the United States and the State with regard to the BPSOU, as provided in this Consent Decree;



e. For AR, on behalf of the Settling Defendants, to provide a \$20,500,000.00 cash payment to the State of Montana to fund the State's BTC Riparian Actions and other State Restoration work to be coordinated with the Remedy;

f. For the State, with the funds provided by AR, to complete the BTC Riparian Actions and, if and to the extent there are excess funds available, to support State Restoration actions coordinated with the Remedy.

6. Commitments by the Settling Defendants. In accordance with the terms in this Consent Decree, the Settling Defendants shall:

a. Reimburse the United States for Federal BPSOU Interim Response Costs, Federal BPSOU Future Response Costs, and pay Oversight Costs at the BPSOU, and to reimburse the State for State BPSOU Future Response Costs, as provided in this Consent Decree;

b. Finance and perform the Work in accordance with this Consent Decree and all deliverables developed by the Settling Defendants and approved or modified by EPA, in consultation with DEQ, pursuant to this Consent Decree; and

c. AR, on behalf of the Settling Defendants, provide a \$20,500,000.00 cash payment to the State of Montana.

7. Nature of Settling Defendant Liability. The Settling Defendants' obligation to finance and perform the Work and obligations to pay amounts due under this Consent Decree and perform other response actions required by this Consent Decree are joint and several. In the event of the insolvency or other failure of one Settling Defendant to implement a Settling Defendant obligation or requirement of this Consent Decree, the remaining Settling Defendants



shall complete all such obligations or requirements. The State has agreed to perform the BTC Riparian Actions. In consideration for the payments made pursuant to Paragraph 20, the Settling Defendants and SFAs are not obligated to perform the BTC Riparian Actions or provide additional funds to finance DEQ's performance of the BTC Riparian Actions.

8. Compliance with Applicable Law. Nothing in this Consent Decree limits Settling Defendants' obligations to comply with the requirements of all applicable federal and state laws and regulations. The Settling Defendants must also comply with all ARARs as set forth in the ROD including any future ESD, and in the manner described by the SOW and its attachments, Appendix D to this Consent Decree. The activities conducted pursuant to this Consent Decree, if approved by EPA, shall be considered to be consistent with the NCP as provided in Section 300.700(c)(3)(ii) of the NCP. In performing the BTC Riparian Actions, DEQ shall also comply with all applicable federal and state laws and regulations, and shall also comply with ARARs applicable to such activities, and in the manner described by Appendix H and SOW Attachment C, Section 5.

9. Permits.

a. As provided in Section 121(e) of CERCLA, 42 U.S.C. § 9621(e), and Section 300.400(e) of the NCP, no permit shall be required for any portion of the Work conducted entirely on-site (i.e., within or in close proximity to the Clark Fork NPL Sites). Where any portion of the Work that is not on-site requires a federal or state permit or approval, the Settling Defendants shall submit timely and complete applications and take all other actions necessary to obtain all such permits or approvals. The BTC Riparian Actions are on-site and no



permit is required for this work, as provided in Section 121(e) of CERCLA, 42 U.S.C. § 9621(e), and Section 300.430(e) of the NCP.

b. The Settling Defendants and the State may seek relief under the provisions of Section XIV (Force Majeure) of this Consent Decree for any delay in the performance of the Work or the BTC Riparian Actions, respectively, resulting from a failure to obtain, or a delay in obtaining, any permit required for the Work or BTC Riparian Actions, respectively.

c. This Consent Decree is not, and shall not be construed to be, a permit issued pursuant to any federal or state statute or regulation.

10. Notice to Successors in Title.

a. The Settling Defendants each individually maintain surface ownership of real property within the BPSOU. With respect to any Source Area Property owned by a Settling Defendant (or where access is controlled by a Settling Defendant) the Settling Defendants shall jointly post and make available for public inspection a notice with a copy of Appendix G (Map of Source Areas) to illustrate Source Area Property within the BPSOU, including Settling Defendants' surface ownership or control of such real property within the BPSOU. The notice, which is subject to review and approval by EPA, in consultation with DEQ, shall indicate: (i) that EPA issued the Record of Decision for the BPSOU in 2006, the ESD for the BPSOU in 2011; and the Record of Decision amendment in 2020; and (ii) that the Settling Defendants have entered into a Consent Decree (including the United States District Court in which the Consent Decree was filed, the name and civil action number of this case, and the date the Consent Decree was entered by the Court) requiring implementation of Work associated with the ROD. Settling Defendants shall submit the notice for review and approval to EPA and DEQ within 60 days of



the Effective Date. The approved notice and a copy of Appendix G (Map of Source Areas) shall be posted and made available for public inspection at the locations and in the manner described in Appendix E (Institutional Controls Implementation and Assurance Plan) within 30 days of EPA's approval, in consultation with DEQ, of the notice.

b. At least twenty-one (21) days prior to the conveyance by any Settling Defendant of its interest in any Source Area Property located within the BPSOU, including but not limited to fee interests, leasehold interests, and mortgage interests, that Settling Defendant shall give the grantee written notice of: (i) this Consent Decree, (ii) any instrument specific to said real property by which an interest in real property has been conveyed that confers a right of access to the BPSOU (hereinafter referred to as "access agreements") pursuant to Section XI (Access and Institutional Controls) or pursuant to any other conveyance, and/or (iii) any instrument specific to said property by which an interest in real property has been conveyed that confers a right to enforce restrictions on the use of such property (hereinafter referred to as "deed restrictions / restrictive easements") pursuant to Section XI (Access and Institutional Controls) or pursuant to any other conveyance. At least twenty-one (21) days prior to such conveyance, the Settling Defendant intending to make any conveyance within the scope of this Paragraph shall also give written notice to EPA, DEQ, and the other Settling Defendants of the planned conveyance, including the name and address of the grantee, and the date on which notice of this Consent Decree, access easements, and/or deed restrictions / restrictive easements are given to the grantee. Nothing in this Consent Decree shall be construed to require the approval of EPA, DEQ, the State or other Settling Defendants before a Settling Defendant conveys a Source Area Property.



c. In the event of such conveyance, the Settling Defendants' obligations under this Consent Decree, including but not limited to the obligation to implement and abide by institutional controls pursuant to Section XI (Access and Institutional Controls), shall continue to be met by the Settling Defendants. In no event shall the conveyance release or otherwise affect the liability of the Settling Defendants to comply with all provisions of this Consent Decree, absent the prior written consent of EPA in consultation with DEQ. If the United States, in consultation with DEQ, approves, the grantee may perform some or all of the Work under this Consent Decree. If the conveyance instrument to the grantee provides for access by EPA and DEQ, the Settling Defendants obligation to provide access to such property is no longer required.

## **VI. PAYMENT OF RESPONSE COSTS**

11. The Silver Bow Creek Butte Area Site Special Account. EPA has established a special account within the EPA Hazardous Substances Superfund called the Silver Bow Creek Butte Area Site Special Account. The amounts paid to the United States under Paragraph 12 (Settling Defendants' Payment of Federal BPSOU Interim Response Costs), Paragraph 16 (Settling Federal Agencies' Payment of Response Costs for the BPSOU), and Paragraph 17 (Settling Defendants' Payment of BPSOU Future Response Costs) shall be deposited in the Silver Bow Creek Butte Area Site Special Account within the EPA Hazardous Substance Superfund to be retained and used to conduct or finance response actions at or in connection with any of the sites or operable units within the Silver Bow Creek Butte Area NPL Site or to the Clark Fork River Basin Special Account to be used to conduct or finance response actions at the Anaconda Smelter NPL Site, the Milltown Reservoir/Clark Fork River NPL Site, the Silver Bow Creek/Butte Area NPL Site or the Montana Pole NPL Site; or to be transferred by EPA to the EPA Hazardous Substance Superfund.



12. Settling Defendants' Payment of Federal BPSOU Interim Response Costs.

Within thirty (30) days following the Effective Date, AR, on behalf of the Settling Defendants, shall pay \$3,500,000 to the Silver Bow Creek Butte Area Site Special Account in settlement of the United States' claim for reimbursement of Federal BPSOU Interim Response Costs, in the manner provided in Paragraph 15 (Instructions for Payment of Federal BPSOU Interim Response Costs and Certain Oversight Costs for the BPSOU) of this Consent Decree. The amount paid by the Settling Defendants under this Paragraph shall be deposited into the Silver Bow Creek Butte Area Site Special Account as described in Paragraph 11 (The Silver Bow Creek Butte Area Site Special Account) above.

13. The Butte Site Special Account. EPA has established a special account within the EPA Hazardous Substance Superfund called the Butte Site Special Account. The amounts paid by the Settling Defendants to the United States under Paragraph 14 (Settling Defendants' Payment of Oversight Costs for the BPSOU) shall be deposited in the Butte Site Special Account within the EPA Hazardous Substance Superfund to be retained and used to conduct or finance response actions at or in connection with the BPSOU or to be transferred by EPA to the Silver Bow Creek Butte Area Special Account or to EPA Hazardous Substance Superfund.

14. Settling Defendants' Payment of Oversight Costs for the BPSOU. In full satisfaction and settlement of the obligation to pay Oversight Costs for the BPSOU, AR, on behalf of the Settling Defendants, shall make the payments set forth below in this Paragraph 14.

a. Within thirty (30) days after the Effective Date, AR, on behalf of the Settling Defendants, shall pay \$2,000,000 to the Butte Site Special Account for Oversight Costs for the BPSOU. The amount paid by the Settling Defendants under this Paragraph shall be



deposited into the Butte Site Special Account as described in Paragraph 13 (The Butte Site Special Account) above.

b. Within one year and thirty days after the Effective Date, AR, on behalf of the Settling Defendants, shall also pay \$2,000,000 plus Interest to the Butte Site Special Account for Oversight Costs for the BPSOU. Interest on such payment shall be calculated from the Effective Date through and including the date on which the payment is received in the Butte Site Special Account.

c. Within two years and thirty days after the Effective Date, AR, on behalf of the Settling Defendants, shall also pay \$2,400,000 plus Interest to the Butte Site Special Account for Oversight Costs for the BPSOU. Interest on such payment shall be calculated from the Effective Date through and including the date on which the payment is received in the Butte Site Special Account.

d. Within three years and thirty days after the Effective Date, AR, on behalf of the Settling Defendants, shall also pay \$2,400,000 plus Interest to the Butte Site Special Account for Oversight Costs for the BPSOU. Interest on such payment shall be calculated from the Effective Date through and including the date on which the payment is received in the Butte Site Special Account.

e. Within four years and thirty days after the Effective Date, AR, on behalf of the Settling Defendants, shall also pay \$2,400,000 plus Interest to the Butte Site Special Account for Oversight Costs for the BPSOU. Interest on such payment shall be calculated from the Effective Date through and including the date on which the payment is received in the Butte Site Special Account.



f. The United States may not recover from the Settling Defendants any Oversight Costs for the BPSOU that the United States or the State incurs at the BPSOU in excess of the amount paid by the Settling Defendants pursuant to this Paragraph except for additional oversight costs the United States or the State incurs based on their respective reserved rights to take additional actions under this Consent Decree pursuant to Section XVII (Covenants and Reservations by the United States and the State).

g. AR shall have the right to pre-pay the payments described in Subparagraphs 14.b, 14.c and 14.d above. However, should AR make a decision to pre-pay, it shall provide the United States with 15 days advance notice of its intent to do so.

15. Instructions for Payment of Federal BPSOU Interim Response Costs and Certain Oversight Costs for the BPSOU. The Financial Litigation Unit (FLU) of the United States Attorney's Office for the District of Montana shall provide Settling Defendants, in accordance with Paragraph 115 (Individuals and Addresses), with instructions regarding making payments to DOJ on behalf of EPA, for payments described pursuant to Paragraph 12 (Settling Defendants' Payment of Federal BPSOU Interim Response Costs) and Subparagraph 14.a (Settling Defendants' Payment of Oversight Costs for the BPSOU). The instructions must include a Consolidated Debt Collection System (CDCS) number to identify payments made under this Consent Decree. For the payments required by Paragraph 12 and Subparagraph 14.a, Settling Defendants shall make such payments by Fedwire Electronic Funds Transfer (EFT), in accordance with the instructions provided under this Paragraph and including references to the CDCS Number, Site/Spill ID Number 08-22, and DJ Number 90-11-2-430. For payments made pursuant to Subparagraph 14.b through 14.e, payment shall be made in the manner described in



Paragraph 17. For each payment made under Paragraphs 12 and 14, Settling Defendants shall send notices, including references to the CDCS, Site/Spill ID, and DJ numbers, to the United States, EPA and the EPA Cincinnati Finance Center, all in accordance with Paragraph 115 (Individuals and Addresses).

16. Settling Federal Agencies' Payment of Response Costs for the BPSOU. As soon as reasonably practicable after the Effective Date of this Consent Decree, the United States, on behalf of the Settling Federal Agencies, shall pay to EPA \$10,000,000 to the Silver Bow Creek Butte Area Site Special Account for reimbursement of Federal BPSOU Past Response Costs, Oversight Costs for the BPSOU and Federal BPSOU Future Response Costs to be incurred by EPA at the BPSOU. The total amount to be paid by the Settling Federal Agencies pursuant to this Paragraph shall be deposited in the Silver Bow Creek Butte Area Site Special Account within the EPA Hazardous Substance Superfund described above in Paragraph 11 (The Silver Bow Creek Butte Area Site Special Account). If the payment to the EPA Hazardous Substances Superfund required by this Paragraph is not made as soon as reasonably practicable, the Director, Legal Enforcement Program, EPA Region 8, may raise any issues relating to payment to the appropriate Department of Justice Assistant Section Chief for the Environmental Defense Section. In the event that payment required by this Paragraph is not made within one hundred and twenty (120) days after the Effective Date, the United States, on behalf of SFAs, shall pay Interest on the unpaid balance, with such Interest commencing on the 121st day after the Effective Date and accruing through the date of the payment. The Parties acknowledge that the payment obligations of the Settling Federal Agencies under this Consent Decree can only be paid from the appropriated funds legally available for such purpose. Nothing in this Consent Decree



shall be interpreted or construed as a commitment or requirement that any Settling Federal Agency obligate or pay funds in contravention of the Anti-Deficiency Act, 31 U.S.C. § 1341, or any other applicable provision of law.

17. Settling Defendants' Payment of BPSOU Future Response Costs.

a. The Settling Defendants shall reimburse the EPA Hazardous Substance Superfund for all Federal BPSOU Future Response Costs that are not inconsistent with the NCP. The amount paid by the Settling Defendants under this Paragraph shall be deposited into the Silver Bow Creek Butte Area Site Special Account as described in Paragraph 11 (The Silver Bow Creek Butte Area Special Account) above. In the year following the Effective Date and in other years where BPSOU Future Response Costs are paid, the United States will exercise best efforts to send to the Settling Defendants an annual bill, including Cost Documentation, requiring payment of Federal BPSOU Future Response Costs. Any failure by the United States to provide such annual billing and/or complete Cost Documentation, however, shall not relieve the Settling Defendants of any obligation under this Consent Decree. The Settling Defendants shall make all payments within sixty (60) days of its receipt of each bill requiring payment, except as otherwise provided in Paragraph 18 (Dispute of BPSOU Future Response Costs). The Settling Defendants shall make all payments required by this Paragraph in the form of a wire transfer as described above, made payable to "EPA Silver Bow Creek Butte Area Special Account Hazardous Substance Superfund" and referencing the EPA Region and Site / Spill ID # 08-22, the DOJ case number 90-11-2-430, and the name and address of the party making payment. The Settling Defendants shall send a notice of such payment to the current EPA Site Attorney, the Cost Recovery Coordinator and the Director of Financial Management Programs,



both at the following address: US EPA Region 8, 1595 Wynkoop Street, Denver, Colorado

80202. The Fedwire EFT payment shall be sent as follows:

Federal Reserve Bank of New York  
ABA = 021030004  
Account = 68010727  
SWIFT address = FRNYUS33  
33 Liberty Street  
New York NY 10045  
Field Tag 4200 of the Fedwire message should read  
“D 68010727 Environmental Protection Agency”

In addition to the notices described above, for each payment made under Paragraphs 12, 14 and 17.a, Settling Defendants shall send notices, including references to the CDCS, Site/Spill ID, and DJ numbers, to the United States, EPA, and the EPA Cincinnati Finance Center, all in accordance with Paragraph 115 (Individuals and Addresses).

b. The Settling Defendants shall reimburse the State for all independently incurred State BPSOU Future Response Costs that are not inconsistent with the NCP. In the year following the Effective Date and in other years where State BPSOU Future Response Costs are paid, the State will exercise best efforts to send the Settling Defendants as appropriate an annual bill, including Cost Documentation, requiring payment of the State’s BPSOU Future Response Costs. Any failure by the State to provide such annual billing and/or complete Cost Documentation, however, shall not relieve the Settling Defendants of any obligation under this Consent Decree. The Settling Defendants shall make all payments within sixty (60) days of its receipt of each bill requiring payment, except as otherwise provided in Paragraph 18 (Dispute of BPSOU Future Response Costs). All payments to the State of Montana under this Section shall be paid by electronic funds transfer in accordance with the instructions provided by the State with the bill. The Settling Defendants shall contact the DEQ Project Officer at least 48 hours



prior to initiating the transfer to provide notice of the date and time of the expected transfer and to confirm the wiring instructions and account and bank routing numbers. If the DEQ Project Officer is unavailable, the Settling Defendants shall contact DEQ Legal Counsel identified in Section XXII (Notices and Submissions). Written confirmation of the payment shall be sent to the State as provided in Section XXII (Notices and Submissions).

18. Dispute of BPSOU Future Response Costs. The Settling Defendants may contest payment of any Federal or State BPSOU Future Response Costs under Paragraph 17 (Settling Defendants' Payment of BPSOU Future Response Costs) solely on the basis that: (a) the United States or the State has made an accounting error including attribution of BPSOU Future Response Costs to the Settling Defendants in a manner inconsistent with this Consent Decree and/or the SOW attached to this Consent Decree as Appendix D; (b) the United States or the State is seeking reimbursement of Oversight Costs for the BPSOU, costs for BTC Riparian Actions, Parrot Tailings Waste Removal costs or other State Restoration costs, other restoration or end land use costs, inconsistent with this Consent Decree; (c) the United States or the State is seeking reimbursement of costs that otherwise do not fall within the definition of Federal or State BPSOU Future Response Costs; (d) a cost item demanded for reimbursement represents costs that are inconsistent with the NCP; or (e) EPA or the State has failed to provide complete Cost Documentation as required by Paragraph 17 (Settling Defendants' Payment of BPSOU Future Response Costs). The failure of the United States or the State to provide complete Cost Documentation shall not relieve the Settling Defendants of any obligation under this Consent Decree, but it may provide the basis for the Settling Defendants to seek, through the dispute resolution provisions of Section XV (Dispute Resolution), a reduction in the Settling



Defendants' obligation to reimburse EPA or the State for those costs which the Settling Defendants claims are not fully supported by Cost Documentation. Any objection made under this Paragraph shall be made in writing within sixty (60) days of receipt of the bill and must be sent to the United States or the State. Any such objection shall specifically identify the contested Federal and State BPSOU Future Response Costs and the basis for objection. In the event of an objection, the Settling Defendants shall within the 60-day period pay all uncontested Federal and State BPSOU Future Response Costs to the United States or the State in the manner described in Paragraph 17 (Settling Defendants' Payment of BPSOU Future Response Costs) and shall initiate the dispute resolution procedures in Section XV (Dispute Resolution). Any such payment made by the Settling Defendants shall be credited by the United States or the State only to the payment of the uncontested costs. If the United States or the State prevails in the dispute, within thirty (30) days of the resolution of the dispute, the Settling Defendants shall pay the sums due (with accrued interest) to the United States or the State, in the manner described in Paragraph 17 (Settling Defendants' Payment of BPSOU Future Response Costs). If the Settling Defendants prevail concerning any aspect of the contested costs, the Settling Defendants shall pay that portion of the costs (plus associated accrued interest), if any, for which they did not prevail to the United States or the State, in the manner described in Paragraph 17 (Settling Defendants' Payment of BPSOU Future Response Costs). The dispute resolution procedures set forth in this Paragraph in conjunction with the procedures set forth in Section XV (Dispute Resolution) shall be the exclusive mechanisms for resolving disputes regarding the Settling Defendants' obligation to reimburse the United States and/or the State for their respective BPSOU Future Response Costs.



19. Interest.

a. In the event that the payments required by (a) Paragraph 12 (Settling Defendants Payment of Federal BPSOU Interim Response Costs), (b) Paragraph 14 (Settling Defendants Payment of Oversight Costs for the BPSOU), (c) Paragraph 17 (Settling Defendants' Payment of BPSOU Future Response Costs); (d) Section XVI (Stipulated Penalties) or Paragraph 20 (Payment to the State) are not made within the time period specified in these Paragraphs or Sections, the Settling Defendants shall pay Interest or State Interest, respectively, on the unpaid balance consistent with the obligations described in Paragraphs 12, 14, 17, 20 and Section XVI (Stipulated Penalties).

b. The Interest and the State Interest, respectively, to be paid on the amounts due under Paragraphs 14 (Settling Defendants Payment of Oversight Costs for the BPSOU) and 20 (Payment to the State) shall begin to accrue thirty (30) days after the Effective Date.

c. The Interest to be paid on the amounts due under Paragraph 12 (Settling Defendants Payment of Federal BPSOU Interim Response Costs) shall begin to accrue sixty (60) days after the Effective Date. The Interest and the State Interest, respectively, to be paid on the amounts due under Paragraph 17 (Settling Defendants Payment of BPSOU Future Response Costs) shall begin to accrue sixty (60) days after the date of receipt by the Settling Defendants of the bill submitted by EPA or the State for such costs. The Interest and State Interest, respectively, to be paid on the amounts due under Section XVI (Stipulated Penalties) shall begin to accrue thirty (30) days after receipt of the stipulated penalty demand; provided, however, for disputed matters involving the performance of Work only, the accrual of interest is stayed if Settling Defendants initiate the dispute resolution procedures in Section XV (Dispute



Resolution), and interest shall not accrue until EPA issues a decision resolving the dispute as provided in Section XV (Dispute Resolution).

d. Interest and State Interest, respectively, shall continue to accrue through the date of the Settling Defendants' payment, except as provided above for accrual of interest on a stipulated penalty demand for matters involving the performance of Work.

e. Payments of Interest made under this Paragraph shall be in addition to such other remedies or sanctions available to the United States or the State by virtue of the Settling Defendants' failure to make timely payments under this Section.

f. The Settling Defendants shall make all payments required by this Paragraph in the manner described in Paragraph 17 (Settling Defendants' Payment of BPSOU Future Response Costs).

20. AR Payment to the State of Montana. In full satisfaction and settlement of the obligation to fund BTC Riparian Actions under this Consent Decree, acknowledging AR's desire for flexibility to meet the timing of financial obligations under this Consent Decree, and in consideration for the State's performance of the BTC Riparian Actions in accordance with this Consent Decree, AR shall make and agrees it will not withhold the payments set forth below in this Paragraph 20.

a. Within thirty (30) days after the Effective Date, AR, on behalf of the Settling Defendants, shall provide a \$10,500,000 cash payment to the State of Montana. Payment shall be made via wire transfer in accordance with instructions to be provided by the State of Montana for deposit in the BPSOU Account.



b. Within one year and thirty days after the Effective Date, AR, on behalf of the Settling Defendants, shall also pay \$5,000,000 plus State Interest to the BPSOU Account. State Interest on such payment shall be calculated from the Effective Date through and including the date on which the payment is received in the BPSOU Account.

c. Within two years and thirty days after the Effective Date, AR, on behalf of the Settling Defendants, shall also pay \$5,000,000 plus State Interest to the BPSOU Account. State Interest on such payment shall be calculated from the Effective Date through and including the date on which the payment is received in the BPSOU Account.

d. AR, on behalf of Settling Defendants, shall contact Ms. Jenny Chambers, Waste Management Division Director, Montana Department of Environmental Quality, P.O. Box 200901, Helena, Montana 59620-0901, (406) 444-6383, jchambers@mt.gov at least 48 hours prior to initiating a transfer to provide notice of the date, time, and amount of the expected transfer and to confirm the wiring instructions, bank routing, and account numbers.

e. AR shall have the right to pre-pay the payments described in Subparagraphs 20.b and 20.c above. However, should AR make a decision to pre-pay any amount, it shall contact Ms. Jenny Chambers, Waste Management Division Director, Montana Department of Environmental Quality, P.O. Box 200901, Helena, Montana 59620-0901, (406) 444-6383, jchambers@mt.gov at least 15 days in advance of its intent to do so.

f. Prior to making the payments described in Subparagraphs 20.b and 20.c above, AR, on behalf of Settling Defendants, shall contact Ms. Jenny Chambers, Waste Management Division Director, Montana Department of Environmental Quality, P.O. Box 200901, Helena, Montana 59620-0901, (406) 444-6383, jchambers@mt.gov and request the



State's invoice owed on each payment (which will include State Interest), which AR may review prior to payment for mathematical accuracy and consistency with the terms of this Consent Decree. In the event of any dispute between AR and the State over the amount of interest owed, such dispute shall not delay AR's payment of the amounts due under this Paragraph and any amount of interest owed on those amounts that AR does not dispute. Any dispute over interest owed by AR shall be subject to dispute resolution under Paragraph 78 (Disputes Solely Between the State and AR).

g. The Further Remedial Elements Scope of Work (FRESOW), Attachment C to Appendix D of the Consent Decree, requires identification of one or more repository locations for tailings, waste, contaminated soils, and contaminated sediments removed from BPSOU pursuant to the FRESOW (collectively referred to in this Paragraph 20.g as Waste Materials). As described in the FRESOW, such repository locations must be approved by EPA in consultation with DEQ. Upon entry of the Consent Decree, the Settling Defendants shall initiate a Repository Siting Study, which shall include a community engagement process. The Repository Study shall not include the Timber Butte area, but shall include the existing Butte Mine Waste Repository and identify other potential repository location(s) to dispose of removed Waste Materials. The draft Repository Siting Study will evaluate potential repository location(s) using criteria provided by EPA and DEQ, and will recommend one or more preferred repository location(s) for the Waste Materials. EPA and DEQ shall review and comment on the draft Repository Siting Study, and the Settling Defendants shall submit a draft final Repository Siting Study in response to those comments. After considering public input on the potential and preferred repository location(s), including the proposed haul route(s), EPA, in consultation with



DEQ will approve the final repository location(s). Following approval of the repository location(s), the Settling Defendants shall develop construction, operation, maintenance and closure plans for the new Waste Materials repository location(s), as have been developed for the existing Mine Waste Repository. AR is responsible for all costs associated with the development, construction, operation and closure of any repository. AR is also responsible for all costs of construction, resurfacing, and maintenance of roads along the final haul route. Outreach to the community regarding all matters associated with the selected repository(s) will be the shared responsibility of the Parties.

(i) AR shall provide one or more approved repository location(s) for up to 240,000 loose cubic yards of Waste Materials removed during DEQ's BTC Riparian Actions project, as described in the FRESOW (BTC Waste Materials). DEQ shall designate the approved repository location for BTC Waste Materials from the final repository locations approved pursuant to Subparagraph 20.g above.

(ii) Beyond the funding provided in Subparagraphs 20(a), (b) and (c) above, AR agrees to reimburse DEQ for excess costs DEQ may incur for the loading, transport, and deposit of up to 240,000 loose cubic yards of BTC Waste Materials to the DEQ-designated approved repository location(s). The Calculated Reimbursement Amount shall equal the actual contract unit rate provided by the lowest responsible and responsive bidder (Contract Unit Rate), minus the baseline unit rate agreed upon by AR and DEQ in Appendix H, Exhibit 1 to this Consent Decree (Baseline Unit Rate), multiplied by the actual volume of BTC Waste Materials transported to the approved repository location(s). The



bidding requirements and reimbursement calculation, including the Baseline Unit Rate are further described in Appendix H, Exhibit 1, to this Consent Decree.

(iii) Following DEQ's selection of the lowest responsible and responsive bidder, DEQ will notify AR of the Calculated Reimbursement Amount based on DEQ's estimate of the total cubic yards to be hauled to the approved repository for BTC Waste Materials. This calculation is detailed in Appendix H, Exhibit 1. DEQ will attach the bid documents that show the DEQ-selected contractor's bid was based on and is consistent with criteria described in Appendix H, Exhibit 1. AR shall have no involvement in DEQ's selection of DEQ's contractor; provided, however, DEQ commits to award the contract in compliance with state procurement laws.

(iv) Within 30 days after DEQ starts the transport of BTC Waste Materials to the approved repository designated by DEQ, AR will pay DEQ an amount equal to 50% of the Calculated Reimbursement Amount. AR shall have no ability to dispute this required payment. AR shall follow the procedure described in Paragraph 20.d and make such payments, and the payment described in subparagraph 20.g.(vi) below, by wire transfer to the BPSOU Account.

(v) DEQ will develop prescriptive requirements in its bid documents on the methodology for determining volume estimates of BTC Waste Materials removed and require its contractor to maintain records of the volume of BTC Waste Materials that are transported to the repository. Following completion of the BTC Riparian Actions work, DEQ will provide AR with a final estimate of the total cubic yards of BTC Waste Materials transported to and deposited at the repository, and an invoice for the



remaining payment balance, if any, for the Calculated Reimbursement Amount in excess of AR's payment made under Subparagraph 20.g.(iv) above. DEQ shall provide to Settling Defendants supporting documentation to describe and corroborate the total volume of Waste Materials hauled to the approved repository designated by DEQ in the same manner and timing that it submits documentation to EPA. DEQ will not object to AR's ability to audit the quantity of estimated volume following an off-load at the approved repository, so long as such audit procedures do not delay or inhibit DEQ's contractor means and methods. If AR believes the estimated volume is not correct, AR must provide DEQ notice of its assertion and documentation of the survey, including photos if any, within 48 hours of conducting the audit.

(vi) AR shall make the payment to DEQ within thirty (30) days of receipt of the invoice from DEQ or within thirty (30) days of DEQ's documentation described in Subparagraph 20.g.(v), above, whichever is later, unless AR invokes the dispute resolution procedures set forth in Section XV, Paragraph 78 (Disputes Solely Between the State and AR). AR may contest DEQ's invoice only on the basis that the invoice amount is: (a) not supported by DEQ's provided documentation described in Subparagraph 20.g.(v) above; or (b) incorrect due to a mathematical error. In the event of any dispute between AR and the State over the amount owed, such dispute shall not delay AR's payment of any undisputed amount due under this Paragraph 20.g.

21. Use of the BPSOU Account. The State of Montana shall use the principal amount and any interest or Earnings on the BPSOU Account solely for implementation of the BTC Riparian Actions; and, if and to the extent funds are not required for the BTC Riparian Actions,



such funds can be used for (i) other State Restoration actions coordinated with the Remedy and (ii) end land use actions identified in the SOW (Attachment C, Addendum 1 (Further Remedial Elements Scope of Work – End Land Use Additions)). The BPSOU Account shall be a State special revenue fund, as provided for in Mont. Code Ann. § 17-2-102(1)(b)(i), and no portion of the amounts deposited in the BPSOU Account under this Consent Decree, or any State Interest or Earnings thereon, is to be treated as State General Fund money, nor is any portion to be converted or transferred to the State General Fund.

## **VII. PERFORMANCE OF THE WORK BY THE SETTLING DEFENDANTS**

22. Settling Defendants' Work. Work described in the SOW is designated as Work to be performed by the Settling Defendants. The BTC Riparian Actions that DEQ has agreed to perform are addressed separately and do not fall within the definition of "Work" under this Consent Decree. Unless otherwise specified, references to any approval in this Consent Decree or attachments means that the approval is by EPA *in consultation with the DEQ*, even when EPA or DEQ is not explicitly mentioned. The following provisions apply to Work to be performed by the Settling Defendants.

### 23. Coordination and Supervision.

#### a. Project Coordinators.

(i) Settling Defendants' Project Coordinator must have sufficient technical expertise to coordinate the Work. Settling Defendants' Project Coordinator may not be an attorney representing any Settling Defendant in this matter and may not act as the Supervising Contractor. Settling Defendants' Project Coordinator may assign other representatives, including other contractors, to assist in coordinating the Work.



(ii) EPA shall designate and notify the Settling Defendants of EPA's Project Coordinator and Alternate Project Coordinator. EPA may designate other representatives, which may include its employees, contractors and/or consultants, to oversee the Work. EPA's Project Coordinator/Alternate Project Coordinator will have the same authority as a remedial project manager and/or an on-scene coordinator, as described in the NCP. This includes the authority to halt the Work and/or to conduct or direct any necessary response action when he or she determines that conditions at the BPSOU constitute an emergency or may present an immediate threat to public health or welfare or the environment due to a release or threatened release of Waste Material.

(iii) The State shall designate and notify EPA and the Settling Defendants of its Project Coordinator and Alternate Project Coordinator. The State may designate other representatives, including its employees, contractors and/or consultants to oversee the Work. For any meetings and inspections in which EPA's Project Coordinator participates, the State's Project Coordinator also may participate. Settling Defendants shall notify the State reasonably in advance of any such meetings or inspections.

(iv) Settling Defendants' Project Coordinators shall meet with EPA's and the State's Project Coordinators at least monthly until the Certification of Remedial Action Completion pursuant to Paragraph 4.7 of the SOW.

(v) Supervising Contractor. Settling Defendants may propose one or more Supervising Contractors to supervise different elements of the Work. Settling Defendants' proposed Supervising Contractor(s) must have sufficient technical expertise to supervise the Work and a quality assurance system that complies with ANSI/ASQC E4-2004,



Quality Systems for Environmental Data and Technology Programs: Requirements with Guidance for Use (American National Standard).

b. Procedures for Disapproval/Notice to Proceed.

(i) Settling Defendants shall designate, and notify EPA, within 30 days after the Effective Date, of the names, contact information, and qualifications of the Settling Defendants' proposed Supervising Contractor(s). Settling Defendants Project Coordinators are Josh Bryson for AR and Julia Crain and Eric Hassler for BSB, as provided below.

(ii) EPA, after a reasonable opportunity for review and comment by DEQ, shall issue notices of disapproval and/or authorizations to proceed regarding the proposed Supervising Contractor(s), and any subsequently named Project Coordinator, as applicable. If EPA issues a notice of disapproval, Settling Defendants shall, within 30 days, submit to EPA a list of supplemental proposed Project Coordinators or Supervising Contractor(s), as applicable, including a description of the qualifications of each. EPA shall issue a notice of disapproval or authorization to proceed regarding each supplemental proposed coordinator and/or contractor. Settling Defendants may select any coordinator/contractor covered by an authorization to proceed and shall, within 21 days, notify EPA of Settling Defendants' selection.

(iii) Settling Defendants may change their Project Coordinators and/or Supervising Contractor(s), as applicable, by following the procedures of Subparagraph 23.b.(i) and (ii).



(iv) Notwithstanding the procedures of stated in this Paragraph, Settling Defendants have proposed, and EPA has authorized Settling Defendants to proceed, regarding the following Project Coordinators: Josh Bryson for Atlantic Richfield Company and Julia Crain and Eric Hassler for BSB.

24. Settling Defendants Performance of Work in Accordance with SOW. Settling Defendants shall: (a) develop the RD; (b) perform the RA; and (c) operate, maintain, and monitor the effectiveness of the RA; all in accordance with the SOW and its attachments, and all EPA-approved, conditionally-approved, or modified deliverables as required by the SOW. All deliverables required to be submitted for approval under the Consent Decree or SOW shall be subject to approval by EPA in accordance with Paragraph 6.6 (Approval of Deliverables) of the SOW.

25. Emergencies and Releases for Settling Defendants. Settling Defendants shall comply with the emergency and release response and reporting requirements under Paragraph 4.4 (Emergency Response and Reporting) of the SOW. Subject to Section XVII (Covenants and Reservations by the United States and the State), nothing in this Consent Decree, including Paragraph 4.4 of the SOW (Emergency Response and Reporting), limits any authority of Plaintiffs: (a) to take all appropriate action to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Material on, at, or from the BPSOU, or (b) to direct or order such action, or seek an order from the Court, to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Material on, at, or from the BPSOU. If, due to Settling Defendants' failure to take appropriate response action under Paragraph 4.4 of the SOW



(Emergency Response and Reporting), EPA or, as appropriate, the State takes such action instead, Settling Defendants shall reimburse EPA and the State under Paragraph 17 (Settling Defendants' Payment of BPSOU Future Response Costs) for all costs of the response action in accordance with the terms of Paragraph 17.

26. Community Involvement by the Settling Defendants. If requested by EPA, Settling Defendants shall conduct community involvement activities under EPA's oversight as provided for in, and in accordance with, Section 2 (Community Involvement) of the SOW. Such activities may include, but are not limited to, designation of a Community Involvement Coordinator.

27. Modification of SOW or Related Deliverables as to Settling Defendants' Work.

a. If EPA, in consultation with DEQ, determines that it is necessary to modify the work specified in the SOW and/or in deliverables developed under the SOW in order to achieve and/or maintain the Performance Standards or to carry out and maintain the effectiveness of the RA, and such modification is consistent with the scope of the remedy set forth in Paragraph 1.3 of the SOW (Scope of the Remedy), then EPA may notify Settling Defendants of such modification. If Settling Defendants object to the modification, they may, within 30 days after EPA's notification, seek dispute resolution under Section XV (Dispute Resolution).

b. The SOW and/or related work plans shall be modified: (1) in accordance with the modification issued by EPA; or (2) if Settling Defendants invoke dispute resolution, in accordance with the final resolution of the dispute. The modification shall be incorporated into and enforceable under this Consent Decree, and Settling Defendants shall implement all work



required by such modification. Settling Defendants shall incorporate the modification into the deliverable required under the SOW, as appropriate.

c. Paragraph 1.3 of the SOW may only be amended or modified by written agreement of the United States, the State and Settling Defendants, with approval from the Court, as a material modification under Paragraph 119 of this Consent Decree.

d. Nothing in this Paragraph shall be construed to limit EPA's or the State's authority to require performance of further response actions as otherwise provided in this Consent Decree.

28. No Warranty for Settling Defendants. Nothing in this Consent Decree, the SOW, or any deliverable required under the SOW constitutes a warranty or representation of any kind by Plaintiffs that compliance with the work requirements set forth in the SOW or related deliverables will achieve the Performance Standards.

#### **VIII. PERFORMANCE OF THE BTC RIPARIAN ACTIONS BY DEQ**

29. DEQ BTC Riparian Actions. The following provisions apply to BTC Riparian Actions to be performed by the DEQ. This Section describes how DEQ, with additional oversight from EPA, will oversee, manage, coordinate, and implement the BTC Riparian Actions and obtain all EPA approvals required by Appendix H using the funds provided by AR under Paragraph 20 of this Consent Decree. Except as provided in Paragraphs 33 (EPA, Settling Defendants, and DEQ Disputes) and 38 (Modification of Appendix H or Related Deliverables for BTC Riparian Actions) of this Consent Decree, the duties and requirements described in this Section are enforceable only by the State and the United States, and nothing in this Section shall be deemed to create a right of any other party, including, but not limited to any Settling



Defendant or any third party, against the State or the United States to enforce the terms of this Section.

30. Performance of BTC Riparian Actions in Accordance with Appendix H. DEQ shall: (a) develop the DEQ-designated RD and (b) perform the DEQ-designated RA; all in accordance with Appendix H and all EPA-approved, conditionally-approved, or modified deliverables. All deliverables from DEQ required to be submitted for approval under the Consent Decree or Appendix H shall be subject to approval by EPA in accordance with Paragraph 6.6 (Approval of Deliverables) of Appendix H. Copies of all draft and final deliverables described in Appendix H shall be shared with Settling Defendants' Project Coordinators when DEQ transmits such documents to EPA. Upon submission of any plan, report, or other document by the DEQ to EPA for review and comment as required by this Consent Decree or the SMOA, EPA shall conduct its review and submit comments, if any, based only on technical adequacy and on consistency with CERCLA, the NCP, the ROD, the SMOA and this Consent Decree. Settling Defendants may also review DEQ deliverables and submit comments, if any, to EPA and DEQ, based only on technical adequacy and on consistency with CERCLA, the NCP, the ROD, and this Consent Decree. DEQ shall incorporate or attempt to resolve all comments submitted by EPA and Settling Defendants, and DEQ shall notify EPA and Settling Defendants of the disposition of comments prior to completing or revising the document. State Restoration activities that are in addition to Remedy, such as the Parrot Tailings Waste Removal, are not a State Restoration project integrated with the Remedy and do not require approval by EPA. EPA's oversight of the restoration work integrated with the Remedy at the Confluence Area will be conducted only to the extent needed to oversee and coordinate remedial



actions at the BPSOU. DEQ's commitment to implement the BTC Riparian Actions is limited to attainment of BTC Riparian Actions Performance Standards, as described in Appendix H and Attachment C to the SOW, Section 5 (the Blacktail Creek Remediation and Contaminated Groundwater Hydraulic Control) (Settling Defendants will complete groundwater remedy elements). Unless EPA agrees otherwise, DEQ shall not commence physical Remedial Action construction activities on the Site unless the Remedial Action Work Plan(s) have been approved by EPA.

31. Contractor Interaction. DEQ shall be responsible for procuring contractors throughout the Remedial Design and Remedial Action process for the BTC Riparian Actions, and all other matters related to implementing and directly overseeing the project. DEQ agrees to coordinate its contractors' activities with Settling Defendants and their contractors performing Work within and adjacent to the BTC Riparian Actions project area to promote project efficiencies and safe work practices and to prevent adverse impacts to existing or planned Work and/or BTC Riparian Actions. During Remedial Design and Remedial Action for the BTC Riparian Actions, EPA and DEQ will oversee the performance of the BTC Riparian Action, but EPA shall not supervise or direct DEQ's contractors or modify the work that the contractors have been directed by the State to perform. Upon agreement by DEQ and by EPA that a modification to a particular construction contract is warranted (except for the contract changes that pertain only to State Restoration that is not a restoration project integrated with the Remedy which require DEQ approval only), DEQ shall make the necessary changes through work directive, change order or contract amendment.



32. DEQ Procurement. DEQ shall undertake all procurement actions in implementing the BTC Riparian Actions in a manner consistent with State law.

33. EPA, Settling Defendants, and DEQ Disputes. Any disagreement between EPA and DEQ regarding approvals or implementation of the BTC Riparian Action shall be the subject of the dispute resolution procedures section of the SMOA in accordance with its terms. Disputes among EPA, DEQ, and Settling Defendants regarding approvals of the BTC Riparian Actions, which are limited to Paragraphs 3.8 (Final (100%) RDs), 4.1 (RA Work Plans), 4.6 (RA Completion), or 4.7 (Certification of BTC Riparian Actions Completion) of Appendix H, shall be subject to the dispute resolution procedures in Paragraphs 70 through 76 of this Consent Decree.

34. United States and State Cooperation. The United States and the State shall cooperate to the fullest extent possible to maximize the use of the resources available for and the environmental benefits to the BPSOU in the successful and cost-effective completion of the DEQ-designated Remedial Design, Remedial Action, Operation and Maintenance, and any modifications thereto. When the State provides EPA with a submittal regarding the BTC Riparian Actions and/or State Restoration for the BPSOU that is neither privileged nor confidential, the State shall concurrently provide a copy of that submittal to AR's and BSB's Project Coordinator designated under Paragraph 22 (Settling Defendants' Work).

35. Settling Defendants and State Cooperation. Settling Defendants and the State agree to cooperate on scheduling and coordination of their respective work obligations. As outlined in Paragraph 20.g of this Consent Decree, AR shall provide an acceptable disposal location or locations for up to 200,000 cubic yards of tailings, waste, and contaminated soils removed by DEQ from the BTC Riparian Actions (as shown in Section 5 of the Remedial



Elements Work Plan Attachment to the SOW, Attachment C), and DEQ shall be responsible for transporting that waste to the disposal site(s). DEQ will transport to and dispose of all municipal wastes it encounters at an appropriate permitted facility. DEQ shall manage construction de-watering water from the BTC Riparian Actions on site where feasible. AR will take the State's BTC Riparian Actions construction de-watering water at the Butte Treatment Lagoons to the extent treatment is needed and at times when the volume and chemistry of such water will not overwhelm the Butte Treatment Lagoons' capacity and/or prevent it from meeting discharge standards, as approved by EPA during Remedial Design. Construction water meeting temporary variance standards does not require treatment.

36. Emergencies and Releases for DEQ. For BTC Riparian Actions, DEQ shall comply with the emergency and release response and reporting requirements under Paragraph 4.4 (Emergency Response and Reporting) of Appendix H. Nothing in this Consent Decree or the SOW limit any authority of EPA or DEQ to

(a) take all appropriate action to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Material on, at, or from the BPSOU, or

(b) direct or order such action, or seek an order from the Court, to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Material on, at, or from the Site.

37. Community Involvement. If requested by EPA, DEQ shall conduct community involvement activities under EPA's oversight as provided for in, and in accordance with, Section 2 (Community Involvement) of Appendix H.



38. Modification of Appendix H or Related Deliverables for BTC Riparian Actions.

a. If EPA, after conferring with DEQ, determines that it is necessary to modify the BTC Riparian Actions specified in Appendix H and/or in deliverables developed under Appendix H in order to achieve and/or maintain the BTC Riparian Actions Performance Standards for which DEQ is responsible (which do not include surface water or ground water ARAR performance standards for which the Settling Defendants are responsible) or to carry out the BTC Riparian Actions, and such modification is consistent with the scope of the remedy set forth in Paragraph 1.3 of Appendix H (Scope of the Remedy) and SOW Attachment C, Section 5 (Blacktail Creek Remediation), then EPA may notify DEQ of such modification, and contemporaneously inform Settling Defendants of such modification. In addition, with EPA approval, DEQ may make modifications consistent with this Paragraph, Paragraph 1.3 of Appendix H, and SOW Attachment C, Section 5 (Blacktail Creek Remediation) and contemporaneously inform Settling Defendants of any such modifications. If DEQ objects to the modification or to EPA's disapproval of a proposed modification, DEQ may, within 30 days after EPA's notification, seek dispute resolution under the SMOA. If Settling Defendants object to EPA's modification or to EPA's approval or disapproval of a modification proposed by DEQ, but only the modification, approval, or disapproval covered by this Paragraph as to Paragraphs 3.8 (Final (100%) RDs), 4.1 (RA Work Plans), 4.6 (RA Completion), or 4.7 (Certification of BTC Riparian Actions Completion) of Appendix H, or to EPA's approval of a modification that changes the requirements of SOW Attachment C, Section 5 (Blacktail Creek Remediation), Settling Defendants may seek dispute resolution under Paragraphs 72 through 76 of this Consent Decree.



b. Appendix H and/or related work plans shall be modified: (1) in accordance with the modification issued or approved by EPA; or (2) if DEQ invokes dispute resolution under the SMOA or if Settling Defendants invokes dispute resolution under Paragraphs 72 through 76 of this Consent Decree, in accordance with the final resolution of the dispute. The modification shall be incorporated into and enforceable under this Consent Decree, and DEQ shall implement all activities required by such modification. DEQ shall incorporate the modification into the deliverable.

39. State Implementation of Parrot Tailings Waste Removal. The State is implementing the Parrot Tailings Waste Removal as outlined in the BAO Plan. For purposes of this Paragraph, the Parties will work cooperatively and coordinate the Settling Defendants' Work and Parrot Tailings Waste Removal during implementation of the Parrot Tailings Waste Removal.

40. No Warranty by DEQ. Nothing in this Consent Decree, Appendix H or any deliverable required under Appendix H constitutes a warranty or representation of any kind by EPA or the State that compliance with the BTC Riparian Actions requirements set forth Appendix H, including BTC Riparian Actions Performance Standards, or related deliverables, will achieve the Performance Standards.

## **IX. REMEDY REVIEW**

41. Periodic Review. Settling Defendants shall conduct, in accordance with Paragraph 4.8 (Periodic Review Support Plan) of the SOW, studies and investigations to support EPA's reviews under Section 121(c) of CERCLA, 42 U.S.C. § 9621(c), and applicable regulations, of whether the RA is protective of human health and the environment.



42. EPA Selection of Further Response Actions. If EPA, in consultation with DEQ, determines, at any time, that the Remedial Action is not protective of human health and the environment, EPA may select further response actions for the BPSOU in accordance with the requirements of CERCLA and the NCP.

43. Opportunity To Comment. The Settling Defendants and, if required by Sections 113(k)(2) or 117 of CERCLA, the public, shall be provided with an opportunity to comment on any further response actions proposed by EPA, in consultation with DEQ, as a result of the review conducted pursuant to Section 121(c) of CERCLA, and to submit written comments for the record during the comment period.

44. Settling Defendants' Obligation To Perform Further Response Actions Pursuant to this Consent Decree. In addition to requirements for further or additional response actions contained in this Consent Decree, if EPA, in consultation with DEQ, selects further response actions for the BPSOU pursuant to an ESD or minor modification memorandum, the Settling Defendants shall undertake such further response actions to the extent that such further actions may be required under this Consent Decree because the further response selection may be lawfully required under an ESD or minor modification to the ROD and the reopener conditions in Paragraph 89 or Paragraph 90 (Pre-certification and Post-certification Reservations) are satisfied. The Settling Defendants may invoke the procedures set forth in Section XV (Dispute Resolution) to dispute (1) EPA's determination that such further actions may be required under this Consent Decree pursuant to an ESD or minor modification to the ROD and/or the reopener conditions of Paragraph 89 or Paragraph 90 (Pre-certification and Post-certification Reservations) of XVII (Covenants and Reservations by the United States and the State) are



satisfied, (2) EPA's determination that the Remedial Action is not protective of human health and the environment, or (3) EPA's selection of the further response actions, including whether such actions may only be selected through amendment of the ROD or EPA's action is inconsistent with the NCP or this Consent Decree. Disputes pertaining to (1) EPA's determination that such further actions may be required under this Consent Decree pursuant to an ESD or minor modification to the ROD and/or the reopener conditions of Paragraph 89 or Paragraph 90 (Pre-certification and Post-certification Reservations) of XVII (Covenants and Reservations by the United States and the State) are satisfied, and/or (2) EPA's determination that the Remedial Action is not protective of human health and the environment, shall be resolved pursuant to Paragraph 75 (Record Review); disputes pertaining to (3) EPA's selection of the further response actions, including whether such actions may only be selected through amendment of the ROD, or EPA's action is inconsistent with the NCP or this Consent Decree, shall be resolved pursuant to Paragraph 76 (Other Review). Nothing in this Paragraph affects or alters EPA's or DEQ's reservations under Paragraph 89 (United States' and State's Pre-Certification Reservations) or Paragraph 90 (United States' and the State's Post-Certification Reservations); or the United States' reservations under Paragraph 92 (General Reservation of Rights), including but not limited to EPA's or DEQ's authority to assert new claims in the Federal Action (but not under this Consent Decree) or bring a new action or issue an administrative order for further response action in accordance with Paragraph 89 (United States' and States' Pre-Certification Reservations) or Paragraph 90 (United States' and State's Post-Certification Reservations); or the United States' reservations under Paragraph 92 (General Reservation of Rights).



45. Submissions of Plans. If the Settling Defendants are required to perform further response actions pursuant to Paragraph 44 (Settling Defendants' Obligation To Perform Further Response Actions Pursuant to this Consent Decree), they shall submit to EPA for approval, in consultation with DEQ, a schedule and plan for such work. After approval of the schedule and plan by EPA, following a reasonable opportunity for comment by DEQ, the Settling Defendants shall implement the plan in accordance with the provisions of this Consent Decree.

#### **X. QUALITY ASSURANCE, SAMPLING, AND DATA ANALYSIS**

46. Sampling QA/QC. The Settling Defendants shall use applicable portions of the approved quality assurance, quality control, and chain of custody procedures for all samples in accordance with the CFRSSI QAPP and any amendments made thereto or alternative plan approved for use in place of the CFRSSI QAPP during the course of the implementation of this Consent Decree. If relevant to the proceeding, the Parties agree that validated sampling data generated in accordance with the QAPP(s) and reviewed and approved by EPA in consultation with DEQ shall be admissible as evidence, without objection, in any proceeding under this Consent Decree. The Settling Defendants shall ensure that EPA and State personnel and their authorized representatives are allowed access at reasonable times to all laboratories utilized by the Settling Defendants in implementing this Consent Decree. In addition, the Settling Defendants shall ensure that such laboratories shall analyze all samples submitted by EPA and the State pursuant to the QAPP for quality assurance monitoring. The Settling Defendants shall ensure that the laboratories they utilize for the analysis of samples taken pursuant to this Consent Decree perform all analyses according to accepted EPA methods. Accepted EPA methods consist of those methods which are documented in the CFRSSI LAP and any amendments made thereto or alternative protocol approved for use in place of the CFRSSI QAPP during the course



of the implementation of this Consent Decree. The Settling Defendants shall ensure that all laboratories they utilize for analysis of samples taken pursuant to this Consent Decree participate in an EPA or EPA-equivalent QA/QC program. The Settling Defendants shall ensure that all field methodologies utilized in collecting samples for subsequent analysis pursuant to this Consent Decree will be conducted in accordance with the procedures set forth in the QAPP or approved protocol.

47. Sampling. Upon request, the Settling Defendants shall allow split or duplicate samples to be taken by EPA and DEQ or their authorized representatives. The Settling Defendants shall notify EPA and DEQ not less than ten (10) days in advance of any non-routine sample collection activity unless shorter notice is agreed to by EPA and DEQ. In addition, EPA and the State shall have the right to take any additional samples that EPA or DEQ deem necessary. Upon request, EPA shall allow the Settling Defendants to take split or duplicate samples of any samples they take as part of EPA's oversight of the Settling Defendants' implementation of the Work.

48. Data Submittal. The Settling Defendants shall submit to both EPA and DEQ one paper copy and an electronic copy of the results of all sampling and/or tests or other data obtained or generated by or on behalf of the Settling Defendants with respect to the BPSOU and/or the implementation of this Consent Decree in the next monthly progress report, unless EPA, after consultation with DEQ, agrees otherwise or unless otherwise provided for in the SOW, RD/RA Work Plan or resulting plans.

49. Authority Reserved. Notwithstanding any provision of this Consent Decree, the United States and the State hereby retain all of their information gathering and inspection



authorities and rights, including enforcement actions related thereto, under CERCLA, RCRA, CECRA and any other applicable federal and state statutes or regulations.

## **XI. ACCESS AND INSTITUTIONAL CONTROLS**

50. Access and Use of Settling Defendant Property. If any Settling Defendant owns, or has a property interest that confers the legal ability to control access on real property within the BPSOU, where access and/or land/water use restrictions are needed to implement this Consent Decree, that Settling Defendant shall, with respect to those properties:

a. Commencing on the date of lodging of this Consent Decree, provide the United States, the State, the other Settling Defendants, and their representatives and contractors, access at all reasonable times to any real property to which access is required for the implementation of this Consent Decree, for the purpose of conducting any activity related to this Consent Decree including, but not limited to, the following activities:

- (i) Monitoring the Work and the BTC Riparian Actions;
- (ii) Implementing the Work and the BTC Riparian Actions;
- (iii) Verifying any data or information submitted to the United States or the State;
- (iv) Conducting investigations relating to contamination at or near the BPSOU;
- (v) Obtaining samples;
- (vi) State Restoration planning, including the Parrot Tailings Waste Removal; provided however, access for State Restoration planning does not include access for construction or any other activities that involve physical disturbance of real property outside the Parrot Tailings Waste Removal and BTC



Riparian Actions project areas. The Parties agree that surface sampling is not considered to be “physical disturbance of real property”;

(vii) Coordinating the design and implementation of the Work with State Restoration, including the Parrot Tailings Waste Removal, and BTC Riparian Actions;

(viii) Assessing the need for, planning, or implementing additional response actions at or near the BPSOU;

(ix) Implementing the Work pursuant to the conditions set forth in Paragraph 93 (Work Takeover) of this Consent Decree;

(x) Assessing the Settling Defendants’ compliance with this Consent Decree; and

(xi) Determining whether the BPSOU is being used in a manner that is prohibited or restricted, or that may need to be prohibited or restricted, by or pursuant to this Consent Decree.

Prior to obtaining access to any real property, the United States, the State and the Settling Defendants shall consider any health and safety limitations previously identified by the other Settling Defendants for the BPSOU. The United States and the State acknowledge that Source Area Property often is located in industrial areas of the BPSOU and due care should be taken by agency officials and representatives when accessing such property.

b. Commencing on the date of lodging of this Consent Decree, refrain from using any real property in any manner that would interfere with or adversely affect the implementation, integrity, or protectiveness of the remedial measures to be performed pursuant



to this Consent Decree (including but not limited to utilization of the ground water for potable domestic use; interference with or destruction of monitoring wells or equipment; interference with or destruction of stormwater conveyance ditches or other similar systems and stormwater basins; interference with or destruction of waste caps and cap vegetation; interference or destruction of any interception, pumping, or treatment plant facilities; or other uses contrary to restrictions on the use or development of property contained in the Institutional Controls Implementation and Assurance Plan for the BPSOU described in Paragraph 54 (Institutional Controls)), except as required to implement the SOW and its Attachments, or as EPA and DEQ authorize in writing after receipt of a written request from a Settling Defendant or property owner to engage in an otherwise restricted activity; and

c. For that Source Area Property only, where new use restrictions are required as is described on Figure 6 in the Institutional Controls Implementation and Assurance Plan for the Butte Site, execute and record in the Recorder's Office of Silver Bow County in the State of Montana, an easement or deed restriction consistent with Montana law, running with the land, which grants a right of access for the purpose of implementing the Remedy and any modifications thereto, and which contains the applicable restrictions referenced in Subparagraph 50.b; provided however, such restrictions shall not interfere with that Settling Defendant's ability to satisfy any response action required by EPA or DEQ. Each Settling Defendant for their Source Area Property shall grant the access rights and the rights to enforce the land and water use restrictions and easements to the United States (on behalf of EPA), the State, and their representatives for certain of their real property, all as described in the Institutional Controls Implementation and Assurance Plan for the Butte Site described in Paragraph 54. Where



appropriate to meet the objectives of this Consent Decree, the United States and the State, or their designees, may agree to be the beneficiary of deed restrictions or accept a conservation easement and may enforce such restrictions or covenants which will run with the land.

d. The placement of new use restrictions and the recording of easements or deed restrictions described in Subparagraph 50.c, respectively, shall not be required for any real property within the BPSOU where a right of access and use restrictions have been granted by the property owner in a conveyance of record or will be granted by a Settling Defendant in a conveyance described in the Institutional Controls Implementation and Assurance Plan. Prior to lodging of this Consent Decree, EPA and DEQ have reviewed the list of certain prior and anticipated conveyances provided by the Settling Defendants and included in Appendix E to this Consent Decree, and approved the conveyances described in Appendix E as meeting the requirements of Subparagraph 50.c.

e. For that Source Area Property that each Settling Defendant owns or has the legal ability to control within the BPSOU for which new restrictions are required, as described in Appendix E to this Consent Decree, that Settling Defendant shall, within 60 days following the Effective Date of this Consent Decree, record the easement required by Subparagraph 50.c and provide EPA and DEQ with a copy of the original recorded easement.

51. Access and Use of Third-Party Property. If any part of the BPSOU where access and/or land/water use restrictions are needed to implement this Consent Decree, is owned or controlled by persons other than the Settling Defendants, the Settling Defendants, as applicable, shall use best efforts to secure from such persons an agreement to provide access thereto for the Settling Defendants, as well as for the United States on behalf of EPA, and the State, as well as



their representatives and contractors, for the purpose of conducting any activity related to this Consent Decree including, but not limited to, those activities listed in Subparagraph 50.a of this Consent Decree. Settling Defendants shall provide a copy of such access and use restriction agreement(s) to EPA and the State. Settling Defendants also shall use best efforts to enforce land and/or water use restrictions established in the ROD as required by the Institutional Controls Implementation and Assurance Plan for the BPSOU, attached as Appendix E to this Consent Decree, to ensure the protectiveness of or non-interference with the Remedy and any modifications thereto. EPA has ordered certain actions relating to the Remedial Action to be performed by the owners/operators of Railroad Properties in a separate enforcement proceeding. The provisions and requirements of Paragraphs 51 and 52 are not applicable to access and use of any part of the Railroad Properties unless access or use on Railroad Properties is required for implementation of the Work, which does not include the actions that person(s) who own, operate, and/or control the Railroad Properties are required to perform.

52. Best Efforts. For purposes of Paragraph 51 (Access and Use of Third Party Property) of this Consent Decree, “best efforts” includes the payment of reasonable sums of money in consideration of access, access agreements, land/water use restrictions, and/or easements or deed restrictions (collectively “Access”). For the BPSOU, “reasonable sums” shall be determined by considering, among other factors, the potentially responsible party status of the current owners and the degree of general cooperation shown by these parties. The United States may, as it deems appropriate, assist the Settling Defendants in obtaining access or land/water use restrictions, either in the form of contractual agreements or in the form of deed restrictions running with the land. The Settling Defendants shall reimburse the United States in accordance



with the procedures in Section XV (Payment of Response Costs), for all costs incurred by the United States in obtaining such access and/or land/water use restrictions.

53. Controlled Ground Water Area Petition. BSB has obtained from the State Department of Natural Resources a petition for a controlled ground water area for the BPSOU alluvial aquifer. The petition also addresses the Butte Mine Flooding operable unit and the ground water contamination associated with the Montana Pole Site. AR has funded BSB, and the other Settling Defendants shall continue to cooperate with BSB, in: (i) the enforcement of the controlled ground water area; and (ii) the funding of any monitoring and enforcement of any water well use restrictions required by the ground water control petition. The Settling Defendants shall also fund BSB's public education and related activities related to the controlled ground water area, as those activities are described in the SOW.

54. Institutional Controls. In addition to the ground water control petition described above in Paragraph 53 (Controlled Ground Water Area Petition), certain land or water use restrictions, in the form of local laws, regulations, ordinances, or other governmental or private controls ("Institutional Controls") are described in the 2006 Record of Decision. Implementation of Institutional Controls is an element of the Work Settling Defendants are required to perform under this Consent Decree, as described in the Institutional Controls Implementation and Assurance Plan for the Butte Site, attached as Appendix E to this Consent Decree; provided, however, Work does not include Residential Solid Media Remedial Action which is implemented through the RMAP-related activities which are described in the Institutional Control Implementation and Assurance Plan for the BPSOU Site. If EPA, in consultation with DEQ, determines that additional land/water use restrictions in the form of state or local laws,



regulations, ordinances or other governmental controls are needed to implement the remedy selected in the ROD, ensure the integrity and protectiveness thereof, or ensure non-interference therewith, the Settling Defendants shall cooperate with EPA's and the State's efforts to secure such governmental controls.

55. Access and Other Authority Reserved. Notwithstanding any provision of this Consent Decree, the United States and the State retain all of their access authorities and rights, as well as all of their rights to require land/water use restrictions, including enforcement authorities related thereto, under CERCLA, RCRA and any other applicable federal and state statute or regulations.

## **XII. FINANCIAL ASSURANCE**

56. Financial Assurance Requirements. In order to ensure completion of the Work, Settling Defendants shall secure financial assurance, initially in the amount of \$125 million ("Estimated Cost of the Work"), for the benefit of EPA. The financial assurance must be one or more of the mechanisms listed below, in a form substantially identical to the relevant sample documents (if any) available from the "Financial Assurance" category on the Cleanup Enforcement Model Language and Sample Documents Database at <https://cfpub.epa.gov/compliance/models/>, and satisfactory to EPA. Settling Defendants may use multiple mechanisms of surety bonds guaranteeing payment, letters of credit, trust funds and/or insurance policies as described below.

a. A surety bond guaranteeing payment and/or performance of the Work that is issued by a surety company among those listed as acceptable sureties on federal bonds as set forth in Circular 570 of the U.S. Department of the Treasury;



b. An irrevocable letter of credit, payable to or at the direction of EPA, that is issued by an entity that has the authority to issue letters of credit and whose letter-of-credit operations are regulated and examined by a federal or state agency;

c. A trust fund established for the benefit of EPA that is administered by a trustee that has the authority to act as a trustee and whose trust operations are regulated and examined by a federal or state agency; or

d. A policy of insurance that provides EPA with acceptable rights as a beneficiary thereof and that is issued by an insurance carrier that is eligible to issue insurance policies in the applicable jurisdiction(s) and whose insurance operations are regulated and examined by a federal or state agency.

e. A guarantee to fund or perform the Work executed in favor of EPA by a company: (1) that is a direct or indirect parent company of a Settling Defendant or has a “substantial business relationship” (as defined in 40 C.F.R. §264.141(h)) with a Settling Defendant; and (2) can demonstrate to EPA’s satisfaction that it meets the financial test criteria of Paragraph 57.

57. Settling Defendants have selected the combination of financial assurance mechanisms described in Paragraph 59 below. In the event Settling Defendants seek to provide financial assurance by means of a guarantee under Subparagraph 56.e, Settling Defendants must at that time:



a. Demonstrate that:

(i) the guarantor has:

- (1) Two of the following three ratios: a ratio of total liabilities to net worth less than 2.0; a ratio of the sum of net income plus depreciation, depletion, and amortization to total liabilities greater than 0.1; and a ratio of current assets to current liabilities greater than 1.5; and
- (2) Net working capital and tangible net worth each at least six times the sum of the Estimated Cost of the Work and the amounts, if any, of other federal, state, or tribal environmental obligations (including but not limited to obligations under CERCLA, RCRA, and CECRA) financially assured through the use of a financial test or guarantee; and
- (3) Tangible net worth of at least \$10 million; and
- (4) Assets located in the United States amounting to at least 90 percent of total assets or at least six times the sum of the Estimated Cost of the Work and the amounts, if any, of other federal, state, or tribal environmental obligations (including but not limited to CERCLA, CECRA and RCRA obligations) financially assured through the use of a financial test or guarantee; or



(ii) The guarantor has:

- (1) A current rating for its senior unsecured debt of AAA, AA, A, or BBB as issued by Standard and Poor's or Aaa, Aa, A or Baa as issued by Moody's; and
- (2) Tangible net worth at least six times the sum of the Estimated Cost of the Work and the amounts, if any, of other federal, state, or tribal environmental obligations (including but not limited to CERCLA, CECRA and RCRA obligations) financially assured through the use of a financial test or guarantee; and
- (3) Tangible net worth of at least \$10 million; and
- (4) Assets located in the United States amounting to at least 90 percent of total assets or at least six times the sum of the Estimated Cost of the Work and the amounts, if any, of other federal, state, or tribal environmental obligations (including but not limited to CERCLA, CECRA and RCRA obligations) financially assured through the use of a financial test or guarantee; and

b. Submit to EPA for the guarantor: (1) a copy of an independent certified public accountant's report of the entity's financial statements for the latest completed fiscal year, which must not express an adverse opinion or disclaimer of opinion; and (2) a letter from its chief financial officer and a report from an independent certified public accountant substantially



identical to the sample letter and reports available from EPA or under the “Financial Assurance - Settlements” subject list category on the Cleanup Enforcement Model Language and Sample Documents Database at <https://cfpub.epa.gov/compliance/models/>.

c. Settling Defendants shall not seek to provide financial assurance by means of a guarantee under Subparagraph 56.e before EPA has approved the KRECCR.

58. Settling Defendants providing financial assurance by means of a guarantee under Subparagraph 56.e must also:

a. Annually resubmit the documents described in Subparagraph 57.b within 90 days after the close of the guarantor's fiscal year;

b. Notify EPA within 30 days after the guarantor determines that it no longer satisfies the relevant financial test criteria and requirements set forth in this Section; and

c. Provide to EPA, within 30 days of EPA's request, reports of the financial condition of the guarantor in addition to those specified above; EPA may make such a request at any time based on a belief that the affected guarantor may no longer meet the financial test requirements of this Section.

59. Financial Assurance Mechanism. Settling Defendants have selected, and EPA has found satisfactory, as an initial financial assurance a combination of (i) trust funds established to fund Work and for the benefit of EPA and (ii) one or more irrevocable letters of credit and/or surety bonds prepared in accordance with Paragraph 56 (Financial Assurance Requirements). If not previously approved, within 30 days after the Effective Date, or 30 days after EPA's approval of the form and substance of Settling Defendants' financial assurance, whichever is later, Settling Defendants shall secure all executed and/or otherwise finalized mechanisms or



other documents consistent with the EPA-approved form of financial assurance and shall submit such mechanisms and documents to the Region 8 financial assurance specialist, to the United States, and to EPA and the State as specified in Section XXII (Notices and Submissions).

60. Diligent Monitoring of Financial Assurance. Settling Defendants shall diligently monitor the adequacy of the financial assurance. If any Settling Defendant becomes aware of any information indicating that the financial assurance provided under this Section is inadequate or otherwise no longer satisfies the requirements of this Section, such Settling Defendant shall notify EPA of such information within 15 days. If EPA determines that the financial assurance provided under this Section is inadequate or otherwise no longer satisfies the requirements of this Section, EPA will notify the affected Settling Defendant of such determination. Settling Defendants shall, within 30 days after notifying EPA or receiving notice from EPA under this Paragraph, secure and submit to EPA for approval a proposal for a revised or alternative financial assurance mechanism that satisfies the requirements of this Section. EPA may extend this deadline for such time as is reasonably necessary for the affected Settling Defendant, in the exercise of due diligence, to secure and submit to EPA a proposal for a revised or alternative financial assurance mechanism, not to exceed 60 days. Settling Defendants shall follow the procedures of Paragraph 62 (Modification of Financial Assurance) in seeking approval of, and submitting documentation for, the revised or alternative financial assurance mechanism. Settling Defendants' inability to secure financial assurance in accordance with this Section shall not excuse performance of any other obligation under this Consent Decree including, without limitation, the obligation of Settling Defendants to complete the Work in accordance with the terms of this Consent Decree.



61. Access to Financial Assurance.

a. If EPA issues a notice of implementation of a Work Takeover under Subparagraph 93.b (Work Takeover) then, in accordance with any applicable financial assurance mechanism and/or related standby funding commitment, EPA is entitled to: (1) the performance of the Work; and/or (2) require that any funds guaranteed for that Work be paid in accordance with Subparagraph 61.d.

b. If EPA is notified by the issuer of a financial assurance mechanism that it intends to cancel such mechanism, and the affected Settling Defendant fails to provide an alternative financial assurance mechanism in accordance with this Section at least 30 days prior to the cancellation date, the funds guaranteed under such mechanism must be paid prior to cancellation in accordance with Subparagraph 61.d.

c. If, upon issuance of a notice of implementation of a Work Takeover under Paragraph 93 (Work Takeover), either: (1) EPA is unable for any reason to promptly secure the resources guaranteed under any applicable financial assurance mechanism and/or related standby funding commitment, whether in cash or in kind, to continue and complete the Work; or (2) the financial assurance is a guarantee under Subparagraph 56.e, then EPA may demand an amount, as determined by EPA, sufficient to cover the cost of the remaining Work to be performed. Settling Defendants shall, within 30 days of such demand, pay the amount demanded as directed by EPA.

d. Any amounts required to be paid under this Paragraph 61 shall be, as directed by EPA: (i) paid to EPA in order to facilitate the completion of the Work by EPA or by another person; or (ii) deposited into an interest-bearing account, established at a duly chartered



bank or trust company that is insured by the FDIC, in order to facilitate the completion of the Work by another person. If payment is made to EPA, EPA may deposit the payment into the EPA Hazardous Substance Superfund or into the Butte Site Special Account within the EPA Hazardous Substance Superfund to be retained and used to conduct or finance response actions at or in connection with the BPSOU, or to be transferred by EPA to the Silver Bow Creek/Butte Area Special Account or the EPA Hazardous Substance Superfund.

e. All EPA Work Takeover costs not paid under this Paragraph 61 must be reimbursed as Future BPSOU Response Costs under Section VI (Payments for Response Costs).

62. Modification of Financial Assurance. Settling Defendants may submit, on any anniversary of the Effective Date or at any other time agreed to by the Parties, a request to reduce the amount, or change the form (subject to the temporal limitation in Paragraph 57.c) or terms, of the financial assurance mechanism. Any such request must be submitted to EPA in accordance with Paragraph 59 (Financial Assurance Mechanism), and must include an estimate of the cost of the remaining Work, an explanation of the bases for the cost calculation, and a description of the proposed changes, if any, to the form or terms of the financial assurance. EPA will notify Settling Defendants of its decision to approve or disapprove a requested reduction or change pursuant to this Paragraph. Settling Defendants may reduce the amount of the financial assurance mechanism only in accordance with: (a) EPA's approval; or (b) if there is a dispute, the agreement, final administrative decision, or final judicial decision resolving such dispute under Section XV (Dispute Resolution). Settling Defendants may change the form or terms of the financial assurance mechanism only in accordance with EPA's approval. Within 30 days after receipt of EPA's approval of, or the agreement or decision resolving a dispute relating to,



the requested modifications pursuant to this Paragraph, Settling Defendants shall submit to EPA documentation of the reduced, revised, or alternative financial assurance mechanism in accordance with Paragraph 59 (Financial Assurance Mechanism).

63. Release, Cancellation, or Discontinuation of Financial Assurance. Settling Defendants may release, cancel, or discontinue any financial assurance provided under this Section only: (a) if EPA issues a Certification of Work Completion under Paragraph 4.9 (Certification of Work Completion) of the SOW; (b) in accordance with EPA's approval of such release, cancellation, or discontinuation; or (c) if there is a dispute regarding the release, cancellation or discontinuance of any financial assurance, in accordance with the agreement, final administrative decision, or final judicial decision resolving such dispute under Section XV (Dispute Resolution).

### **XIII. INDEMNIFICATION AND INSURANCE**

64. Settling Defendants' Indemnification of the United States and the State.

a. The United States and the State do not assume any liability by entering into this agreement or by virtue of any designation of the Settling Defendants as EPA's authorized representatives under Section 104(e) of CERCLA or state law. The Settling Defendants shall indemnify, save, and hold harmless the United States and the State, and their officials, agents, employees, contractors, subcontractors, or representatives for or from any and all claims or causes of action arising from, or on account of, negligent or other wrongful acts or omissions of the Settling Defendants and their respective officers, directors, employees, agents, contractors, subcontractors, and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Consent Decree, including, but not limited to, any claims arising from any designation of the Settling Defendants as EPA's authorized representatives



under Section 104(e) of CERCLA or state law. Further, the Settling Defendants agree to pay the United States and the State all costs they incur, including, but not limited to, attorneys fees and other expenses of litigation and settlement arising from, or on account of, claims made against the United States or the State based on negligent or other wrongful acts or omissions of the Settling Defendants, their respective officers, directors, employees, agents, contractors, subcontractors, and any persons acting on their behalf or under their control, in carrying out activities relating to the BPSOU pursuant to this Consent Decree. Neither the United States nor the State shall be held out as a party to any contract entered into by or on behalf of one or any combination of the Settling Defendant(s) in carrying out activities pursuant to this Consent Decree. Neither the Settling Defendants nor any such contractor shall be considered an agent of the United States or the State.

b. The United States or the State, respectively, shall give the Settling Defendants notice of any third-party claim for which the United States or the State plans to seek indemnification pursuant to this Paragraph 62 (Settling Defendants' Indemnification of the United States and the State), and shall consult with the Settling Defendants prior to settling such claim.

65. Waiver of Claims. The Settling Defendants waive all claims against the United States and the State for damages or reimbursement or for set-off of any payments made or to be made to the United States or the State arising from or on account of any contract, agreement, or arrangement between the Settling Defendants, individually or collectively, and any person for past performance of response activities at the BPSOU or performance of activities required under this Consent Decree, including, but not limited to, claims on account of construction delays. In



addition, the Settling Defendants shall indemnify, save and hold harmless the United States and the State with respect to any and all claims for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between the Settling Defendants and any person for performance of any activities relating to the BPSOU under this Consent Decree, including, but not limited to, claims on account of construction delays. For purposes of this Paragraph, Settling Defendants have no obligation to indemnify the State for construction delays related to the BTC Riparian Actions.

66. Comprehensive General Liability and Automobile Insurance.

a. Prior to lodging of this Consent Decree, AR has provided the United States and the State with information that satisfied the United States and the State that its financial resources and ability to provide the equivalent of comprehensive general liability insurance and automobile insurance with limits of two million dollars, combined single limit, which it shall maintain for the duration of the Work at the BPSOU. BSB has provided the United States and the State with information that satisfied the United States and the State that its financial resources and ability to provide the equivalent of comprehensive general liability insurance and automobile insurance with limits of \$750,000 per claim and \$1.5 million per occurrence, which it shall maintain for the duration of the Work at the BPSOU.

b. If, prior to the first anniversary of EPA's Certification of Completion of Remedial Action pursuant to Paragraph 4.7 (Certification of RA Completion) of the SOW, any material change occurs in the financial resources of any Settling Defendant such that the Settling Defendant may no longer be able to assure its ability to provide the equivalent of comprehensive general liability insurance and automobile insurance with limits of two million dollars, combined



single limit, that Settling Defendant shall promptly notify the United States and the State in accordance with Paragraph 115 (Individuals and Addresses) of Section XXII (Notices and Submissions). Upon receipt of such notice, EPA may, in its sole and unreviewable discretion, after reasonable opportunity for review by the State, require that Settling Defendant obtain that insurance.

c. If, prior to the first anniversary of EPA's Certification of Completion of Remedial Action pursuant to Paragraph 4.7 (Certification of RA Completion) of the SOW, the United States or the State obtains information regarding any material change in the financial resources of a Settling Defendant that leads the United States, in consultation with the State, to believe that Settling Defendant may no longer have the financial ability to provide the equivalent of comprehensive general liability insurance and automobile insurance with limits of two million dollars, combined single limit, the United States shall so notify that Settling Defendant in accordance with Paragraph 115 (Individuals and Addresses) of Section XXII (Notices and Submissions). The Settling Defendant shall have sixty (60) days after receiving any such written notice to respond and provide corrected or supplemental information or otherwise assure the United States and the State that it has the ability to provide the equivalent of comprehensive general liability insurance and automobile insurance with limits of two million dollars, combined single limit.

d. If the Settling Defendant does not satisfactorily resolve the United States' concerns that a material change has occurred in its financial resources such that the Settling Defendant may no longer have the financial ability to provide the equivalent of comprehensive general liability and automobile insurance with limits of two million dollars, combined single



limit, EPA, in consultation with the State and in its sole and unreviewable discretion, may require that Settling Defendant to obtain such insurance which names the United States and the State as additional beneficiaries and/or additional insureds.

e. In addition, for the duration of the Consent Decree, the Settling Defendants shall also satisfy, or shall ensure that their contractors or subcontractors satisfy, all applicable laws and regulations regarding the provision of workers' compensation insurance for all persons performing activities required of the Settling Defendants by this Consent Decree. Until EPA issues its notice of completion of remedial action pursuant to Paragraph 4.7 (Certification of RA Completion) of the SOW, the Settling Defendants shall provide to EPA and the State certificates of such insurance. The Settling Defendants shall resubmit such certificates each year on or before January 30<sup>th</sup>. If a Settling Defendant demonstrates by evidence satisfactory to EPA and the State that any contractor or subcontractor maintains insurance equivalent to that described above, or insurance covering the same risks but in a lesser amount, then, with respect to that contractor or subcontractor, that Settling Defendant need provide only that portion of the insurance described above which is not maintained by the contractor or subcontractor.

#### **XIV. FORCE MAJEURE**

67. Definition. "Force Majeure," for purposes of this Consent Decree, is defined as any event arising from causes beyond the control of the Settling Defendants or DEQ, of any entity controlled by the Settling Defendants or DEQ, or of the Settling Defendants' or DEQ's contractors, that delays or prevents the performance of any obligation under this Consent Decree despite the Settling Defendants' or DEQ's best efforts to fulfill the obligation. The requirement that the Settling Defendants and/or DEQ exercise "best efforts to fulfill the obligation" under this



Paragraph includes using best efforts to anticipate any potential force majeure event and best efforts to address the effects of any potential force majeure event (1) as it is occurring and (2) following the potential force majeure event, such that the delay is minimized to the greatest extent possible. “Force Majeure” does not include financial inability of Settling Defendants to complete the Work or a failure to attain the Performance Standards. A Force Majeure event may, however, include a labor strike or work stoppage directly related to remedial construction activities at the BPSOU.

68. Notification. If any event occurs or has occurred that may delay the performance of any obligation under this Consent Decree, whether or not caused by a force majeure event, the Settling Defendants and/or DEQ shall notify orally EPA’s Project Coordinator or, in his or her absence, the Director, Superfund and Emergency Management Division, EPA Region 8, and, for Settling Defendants, shall also notify orally the State Project Coordinator, within seven (7) days of when the Settling Defendants or DEQ first knew that the event might cause a delay. Within twelve (12) days thereafter, the Settling Defendants and/or DEQ shall provide in writing to EPA, and, for Settling Defendants, the State an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; the Settling Defendants’ and/or DEQ’s rationale for attributing such delay to a force majeure event if they intend to assert such a claim; and a statement as to whether, in the opinion of the Settling Defendants or DEQ, such event may cause or contribute to an endangerment to public health, welfare or the environment. The Settling Defendants and/or DEQ shall include with any notice all available documentation supporting



their claim that the delay was attributable to a force majeure. The Settling Defendants and DEQ shall be deemed to know of any circumstance of which the Settling Defendants or DEQ, any entity controlled by any Settling Defendants or DEQ, or the Settling Defendants' or DEQ's contractors or subcontractors knew or should have known. Failure to comply with the above requirements regarding an event shall preclude Settling Defendants or DEQ from asserting any claim of force majeure regarding that event, provided, however, that if EPA, despite the late or incomplete notice, is able to assess to its satisfaction whether the event is a force majeure under Paragraph 67 (Definition) and whether Settling Defendants or DEQ have exercised their best efforts under Paragraph 67 (Definition), EPA, in consultation with DEQ, may excuse in writing Settling Defendants' failure to submit timely or complete notices under this Paragraph.

69. EPA Response. If EPA, after a reasonable opportunity for review and comment by DEQ, agrees that the delay or anticipated delay is attributable to a force majeure event, the time for performance of the obligations under this Consent Decree that are affected by the force majeure event will be extended by EPA, after a reasonable opportunity for review and comment by DEQ, for such time as is necessary to complete those obligations. If EPA, after a reasonable opportunity to review and comment by DEQ agrees that the delay or anticipated delay is attributable to a force majeure event, EPA will notify the Settling Defendants or DEQ in writing of the length of the extension, if any, for performance of the obligations affected by the force majeure event. An extension of the time for performance of the obligations affected by the force majeure event shall not, of itself, extend the time for performance of any other obligation. If EPA, after a reasonable opportunity for review and comment by DEQ, does not agree that the



delay or anticipated delay has been or will be caused by a force majeure event, EPA will notify the Settling Defendants or DEQ in writing of its decision.

70. Dispute. If the Settling Defendants elect to invoke the dispute resolution procedures set forth in Section XV (Dispute Resolution) regarding EPA's decision, it shall do so no later than 15 days after receipt of EPA's notice. In any such proceeding, the Settling Defendants shall have the burden of demonstrating by a preponderance of the evidence that the delay or anticipated delay has been or will be caused by a force majeure event, that the duration of the delay or the extension sought was or will be warranted under the circumstances, that best efforts to fulfill the obligation were exercised to avoid and mitigate the effects of the delay, and that the Settling Defendants complied with the requirements of Paragraphs 67 (Definition) and 68 (Notification), above. If the petitioning Settling Defendant(s) carry this burden, the delay at issue shall be deemed not to be a violation by the Settling Defendants of the affected obligation of this Consent Decree identified to EPA and the Court. Any dispute of EPA's decision by DEQ shall be done in accordance with the SMOA.

71. EPA Timely Completion. The failure by EPA to timely complete any obligation under the Consent Decree or under the SOW or under Appendix H is not a violation of the Consent Decree, provided, however, that if such failure prevents Settling Defendants or DEQ from meeting one or more deadlines in the SOW, Settling Defendants or DEQ may seek relief under this Section.

## **XV. DISPUTE RESOLUTION**

72. Exclusivity. Unless otherwise expressly provided for in this Consent Decree, the dispute resolution procedures of this Section shall be the exclusive mechanism to resolve disputes between: (1) the United States and the Settling Defendants arising under or with respect



to this Consent Decree; or (2) among the United States, the State, and the Settling Defendants collectively arising under or with respect to this Consent Decree, including the disputes that arise under Section VIII (Performance of the BTC Riparian Actions by DEQ). The procedures set forth in this Section shall not apply to actions by the United States or the State to enforce obligations of the Settling Defendants that have not been disputed in accordance with this Section. EPA's decisions under these procedures, except for EPA's final administrative decision under Paragraph 76 (Other Review), will be made in consultation with the State.

73. Informal Dispute Resolution. Any dispute which arises under or with respect to this Consent Decree shall in the first instance be the subject of informal negotiations between the parties to the dispute. The period for informal negotiations shall not exceed 20 days from the time the dispute arises, unless it is modified by written agreement of the parties to the dispute. The dispute shall be considered to have arisen when one party to the dispute sends the other party to the dispute a written Notice of Dispute.

74. Statement of Positions.

a. In the event that the parties to the dispute cannot resolve a dispute by informal negotiations under the preceding Paragraph, then the position advanced by EPA shall be considered binding unless, within thirty (30) days after the conclusion of the informal negotiation period, one or more of the Settling Defendants invokes the formal dispute resolution procedures of this Section by serving on the United States and the State a written Statement of Position on the matter in dispute, including, but not limited to, any factual data, analysis or opinion supporting that position and any supporting documentation relied upon by the Settling Defendants. The Statement of Position shall specify the petitioning Settling Defendants'



position as to whether formal dispute resolution should proceed under Paragraph 75 (Record Review) or Paragraph 76 (Other Review).

b. Within thirty (30) days after receipt of the Settling Defendants' Statement of Position, EPA, after consulting with the State, will serve on the Settling Defendants EPA's Statement of Position, including, but not limited to, any factual data, analysis, or opinion supporting that position and all supporting documentation relied upon by EPA. EPA's Statement of Position shall include a statement as to whether formal dispute resolution should proceed under Paragraph 75 (Record Review) or Paragraph 76 (Other Review). Not more than thirty (30) days after receipt of EPA's Statement of Position, the Settling Defendants may submit a further statement of position in reply.

c. If there is disagreement between EPA and the petitioning Settling Defendants as to whether dispute resolution should proceed under Paragraph 75 (Record Review) or Paragraph 76 (Other Review), the parties to the dispute shall follow the procedures set forth in the Paragraph determined by EPA to be applicable. If the petitioning Settling Defendants ultimately appeal to the Court to resolve the dispute, the Court shall determine which Paragraph is applicable in accordance with the standards of applicability set forth in Paragraphs 75 (Record Review) and 76 (Other Review).

75. Record Review. Formal dispute resolution for disputes pertaining to the selection or adequacy of any response action and any other disputes that are accorded review on the administrative record under applicable principles of administrative law shall be conducted pursuant to the procedures set forth in this Paragraph. For purposes of this Paragraph, the adequacy of any response action includes, without limitation: (1) the adequacy or



appropriateness of plans, procedures to implement plans, or any other items requiring approval by EPA under this Consent Decree; and (2) the adequacy of the performance of response actions taken pursuant to this Consent Decree. Nothing in this Consent Decree shall be construed to allow any dispute by any Settling Defendant(s) regarding the validity of the ROD's provisions except as specifically provided in Section IX (Remedy Review).

a. An administrative record of the dispute shall be maintained by EPA and shall contain all statements of position, including supporting documentation, submitted pursuant to this Section. Where appropriate, EPA may allow submission of supplemental statements of position by the parties to the dispute.

b. The Regional Counsel, EPA Region 8, will issue a final administrative decision resolving the dispute based on the administrative record described in Subparagraph 75.a. This decision shall be binding upon the Settling Defendants, subject only to the right to seek judicial review pursuant to Subparagraphs 75.c and d.

c. Any administrative decision made by EPA pursuant to Subparagraph 75.b shall be reviewable by this Court, provided that a motion for judicial review of the decision is filed by the Settling Defendants with the Court and served on the Parties within thirty (30) days of receipt of EPA's decision. The motion shall include a description of the matter in dispute, the efforts made by the parties to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of this Consent Decree. The United States may file a response to the petitioning Settling Defendants' motion within 30 days of receipt of that motion.



d. In proceedings on any dispute governed by this Paragraph, the petitioning Settling Defendants shall have the burden of demonstrating that the decision of the Regional Counsel, EPA Region 8, is arbitrary and capricious or otherwise not in accordance with law. Judicial review of EPA's decision shall be on the administrative record compiled pursuant to Subparagraph 75.a.

76. Other Review. Formal dispute resolution for disputes that neither pertain to the selection or adequacy of any response action nor are otherwise accorded review on the administrative record under applicable principles of administrative law, shall be governed by this Paragraph.

a. Following receipt of the petitioning Settling Defendants' Statement of Position submitted pursuant to Paragraph 74 (Statement of Positions), the Regional Counsel, EPA Region 8, will issue a final decision resolving the dispute based on the statements of position and reply, if any, served under Paragraph 74 (Statement of Positions). The Regional Counsel's decision shall be binding on Settling Defendants unless, within thirty (30) days of receipt of the decision, one or more Settling Defendants file with the Court and serve on the parties a motion for judicial review of the decision setting forth the matter in dispute, the efforts made by the parties to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of this Consent Decree. The United States may file a response to the petitioning Settling Defendants' motion within 30 days of receipt of the motion.



b. Notwithstanding Section I (Background) Recital S of this Consent Decree, judicial review of any dispute governed by this Paragraph shall be governed by applicable principles of law.

77. No Postponement. The invocation of formal dispute resolution procedures under this Section does not extend, postpone or affect in any way any obligation of any Settling Defendant(s) under this Consent Decree, not directly in dispute, unless EPA agrees or the Court orders otherwise or unless specifically provided in this Consent Decree. Stipulated penalties with respect to the disputed matter shall continue to accrue but payment shall be stayed pending resolution of the dispute as provided in Paragraph 84 (Penalty Accrual). Notwithstanding the stay of payment, stipulated penalties shall accrue from the first day of noncompliance with any applicable provision of this Consent Decree. In the event that the petitioning Settling Defendant(s) do not prevail on the disputed issue, stipulated penalties shall be assessed and paid as provided in this Section and Section XVI (Stipulated Penalties). Stipulated penalties shall not be assessed by the United States nor paid by the Settling Defendants to the extent that the Settling Defendants prevail on the disputed issue.

78. Dispute Resolution Solely Between the State and AR.

a. In the event a dispute should arise solely between AR and the State regarding the interpretation or implementation of Paragraph 20 (AR Payment to the State of Montana), Paragraph 35 (Settling Defendants and State Cooperation), or Section XVI (Stipulated Penalties), AR and the State shall make a good faith effort to resolve the dispute prior to invoking the continuing jurisdiction of the Court. The invocation of formal dispute resolution procedures under this Section shall not extend, postpone or affect in any way any obligation of



AR under this Consent Decree that is not directly in dispute, unless the State agrees or the Court orders otherwise. In the event that AR and the State cannot resolve the dispute by informal negotiations under the preceding Paragraph, then the position advanced by the State shall be considered binding unless, not more than twenty (20) days after the conclusion of the informal negotiation period, AR invokes the formal dispute resolution procedures of this Section by serving on the State a written Statement of Position on the matter in dispute, including, but not limited to, any factual data, analysis or opinion supporting that position and any supporting documentation relied upon by AR.

b. Within twenty (20) days after receipt of AR's Statement of Position, the State will serve on AR the State's Statement of Position, including, but not limited to, any factual data, analysis, or opinion supporting that position and all supporting documentation relied upon by the State. Not more than ten (10) days after receipt of the State's Statement of Position, AR may submit a further Statement of position in reply. Copies of all papers submitted by either AR or the State in connection with a dispute shall also be served on the other Parties to this Consent Decree.

c. Following receipt of AR's Statement of Position and any further reply submitted by AR pursuant to Subparagraph 78.b, the Attorney General of the State will issue a final decision within twenty (20) days resolving the dispute. The Attorney General's decision shall be binding on AR unless, within twenty (20) days of receipt of the decision, AR files with the Court and serves on the Parties a motion for judicial review of the Attorney General's decision. AR's motion, supporting briefs and evidence shall set forth the matter in dispute, arguments supporting its position, the efforts made by the parties to resolve the dispute, the relief



requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of this Consent Decree. The State may file a response to AR's motion within 20 days of receipt of the motion. Judicial review of any dispute arising under this section shall be governed by applicable principles of law and the provisions of this Consent Decree.

## **XVI. STIPULATED PENALTIES**

79. Stipulated Penalties. The Settling Defendants shall be liable for stipulated penalties in the amounts set forth in Paragraph 80 (Amounts and Triggering Events) to the United States for failure to comply with the requirements of this Consent Decree specified below, unless excused under Section XIV (Force Majeure). The Settling Defendants shall be liable for stipulated penalties in the amounts set forth in Paragraph 80 (Amounts and Triggering Events) to the State only for failure to comply with the requirements of Paragraph 20 of this Consent Decree, unless excused under Section XIV (Force Majeure). "Compliance" by the Settling Defendants shall include completion of the activities and obligations, including payments, required under this Consent Decree or any work plan or other deliverable approved under this Consent Decree identified below in accordance with all applicable requirements of law, this Consent Decree, the SOW, and any plans or other documents approved by EPA pursuant to this Consent Decree and within the specified time schedules established by and approved under this Consent Decree.

### **80. Amounts and Triggering Events.**

a. The following stipulated penalties shall accrue per violation per day for any noncompliance identified in Subparagraph 80.b:



<u>Penalty Per Violation Per Day</u>	<u>Period of Noncompliance</u>
\$5,000	1st through 14th day
\$6,500	15th through 30th day
\$8,500	31st day and beyond

b. Failure to comply with any of the requirements in Section VI (Payment of Response Costs), Section VII (Performance of the Work by the Settling Defendants) including Section 3 of the SOW (Remedial Design) and Section 4 (except Paragraph 4.4.) of the SOW (Remedial Action), Section IX (Remedy Review), Section XI (Access and Institutional Controls), and Section XII (Financial Assurance), except as provided in the following sentence. Stipulated penalties shall not be assessed for: (i) noncompliance with Paragraph 35 (Settling Defendants and State Cooperation); (ii) an exceedance or other noncompliance with in-stream surface water Performance Standards under this Consent Decree, as provided in Attachments A and D to SOW, Appendix D; or (iii) noncompliance with any Work requirements described in Sections 2, 4, and 7 of Attachment A (Compliance Determination Plan, including the Surface Water Management Plan) to the SOW, except that stipulated penalties may be assessed by the United States for the Settling Defendants' failure to perform additional work requirements under Section 7 of Attachment A to the SOW and Paragraph 27 of this Consent Decree after the Settling Defendants have been ordered to perform such additional work by the United States or, if the Settling Defendants dispute any such additional work requirement, stipulated penalties may be assessed after the Settling Defendants have been ordered by the Court to perform such additional work and do not timely perform.



c. The following stipulated penalties shall accrue per violation per day for any noncompliance identified in Paragraph 80.d:

<u>Penalty Per Violation Per Day</u>	<u>Period of Noncompliance</u>
\$3,000	1st through 14th day
\$4,500	15th through 30th day
\$6,000	31st day and beyond

d. Failure to comply with any of the requirements in Section X (Quality Assurance, Sampling, and Data Analysis), Section XIII (Indemnification and Insurance), Section XX (Access to Information), Section XXI (Retention of Records), Section XXII (Notices and Submissions), Paragraph 4.4 of the SOW (Emergency Response and Reporting), Section 5 of the SOW (Reporting), and Section 6 of the SOW (Deliverables).

e. Except as provided below, the following stipulated penalties shall accrue per violation per day for any violation of the Performance Standards for the Butte Treatment Lagoon (“BTL”) discharge, as described in the Compliance Determination Plan, Attachment A to the SOW:

<u>Penalty Per Violation Per Day</u>	<u>Period of Noncompliance</u>
\$1,500	5th through 14th day
\$2,000	15th through 30th day
\$3,000	31st day and beyond

During the Interim Monitoring Period for BTL, described in Attachment A to the SOW, BPSOU Surface Water Compliance Determination Plan, no stipulated or statutory penalties apply to the BTL discharge. After completion of the optimization period described in Attachment A, stipulated penalties shall not accrue during the first four consecutive days of violations of any of



the Performance Standards for the BTL discharge; provided, however, that neither the United States nor the State waive their respective rights at any time to enforce the BTL discharge Performance Standards and/or, after the optimization period described in Attachment A to the SOW, to seek civil penalties under Section 109 of CERCLA, 42 U.S.C. § 9609, for any violation of the BTL discharge Performance Standards. There are no stipulated or statutory penalties applicable to exceedances of in-stream surface water Performance Standards; provided, however, that neither the United States nor the State waive their respective rights at any time to enforce these in-stream Performance Standards in accordance with the provisions of this Consent Decree and Attachment A to the SOW.

f. In the event that EPA assumes performance of a portion or all of the Work pursuant to Paragraph 93 (Work Takeover) of Section XVII (Covenants and Reservations by the United States and the State), the Settling Defendants shall be liable for a stipulated penalty in the amount of \$1,000,000; provided, however, that this stipulated penalty shall not exceed 30% of the present value of the Work to be taken over, based on EPA's cost estimates and a discount rate of 5%. Stipulated penalties under this Paragraph are in addition to the remedies available under Paragraph 61 (Access to Financial Assurance) and 93 (Work Takeover).

g. Except as provided in Paragraph 80.e, all stipulated penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs, and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity; provided, however, that stipulated penalties shall not accrue: (1) with respect to a deficient submission under Section 6 of the SOW (Deliverables), during the period, if any, beginning on the twenty-first (21<sup>st</sup>) day after EPA's receipt of such submission until five



days after the date that EPA notifies the Settling Defendants of any deficiency; (2) with respect to a decision by the Regional Counsel, EPA Region 8, under Subparagraph 75.b or 76.b of Section XV (Dispute Resolution), during the period, if any, beginning on the 21st day after the date that the Settling Defendants' reply to EPA's Statement of Position is received until five days after the date that the Regional Counsel, EPA Region 8 issues a final decision regarding such dispute; or (3) with respect to judicial review by this Court or the Court of Appeals of any dispute under Section XV (Dispute Resolution), during the period, if any, beginning on the 31st day after the Court's receipt of the final submission regarding the dispute until five days after the date that the Court issues a final decision regarding such dispute. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Consent Decree. Any violation of the compliance milestones set forth in Section 3 (Remedial Design) of the SOW, however, shall not also constitute a separate violation of the compliance milestones set forth in Section 4 (Remedial Action) of the SOW.

81. Notice. Following EPA's or the State's determination, in consultation with the other governmental party, that the Settling Defendants have failed to comply with a requirement of this Consent Decree, EPA or the State shall give the Settling Defendants written notification of the same and describe the noncompliance. If EPA or the State determine that stipulated penalties are applicable to a noncompliance event, EPA or the State may send the Settling Defendants a written demand for the payment of the penalties. However, stipulated penalties shall accrue as provided in Paragraph 77 (No Postponement) and Paragraph 80 (Amounts and Triggering Events) regardless of whether EPA has provided a written demand to Settling Defendants for the payment of penalties.



82. Payment. All penalties accruing under this Section shall be due and payable to the United States or the State within thirty (30) days of any Settling Defendants' receipt from EPA or the State of a demand for payment of the stipulated penalties, unless the Settling Defendants invoke the Dispute Resolution procedures under Section XV (Dispute Resolution). All payments to the United States or the State under this Section shall be made in accordance with Paragraph 17 (Settling Defendants' Payment of BPSOU Future Response Costs) or Paragraph 20 (AR Payment to the State of Montana).

83. Obligation to Perform Work. The payment of stipulated penalties shall not alter in any way the Settling Defendants' obligation to complete the performance of the Work required under this Consent Decree.

84. Penalty Accrual. Penalties shall continue to accrue as provided in Paragraphs 81 (Notice) during any dispute resolution period, but need not be paid until the following:

a. If the dispute is resolved by agreement or by a decision of EPA that is not appealed to this Court, the Settling Defendants shall pay accrued stipulated penalties determined to be owing to EPA and Interest in accordance with Paragraph 19 (Interest) within fifteen (15) days of the agreement or the receipt of EPA's decision or order;

b. If the dispute is appealed to this Court and the United States or the State, as appropriate, prevails in whole or in part, the Settling Defendants shall pay all accrued stipulated penalties determined by the Court and Interest in accordance with Paragraph 19 (Interest) to be owed to EPA within sixty (60) days of receipt of the Court's decision or order, except as provided in Subparagraph 84.c, below; and



c. If the District Court's decision is appealed by any Party, Interest (in accordance with Paragraph 19 (Interest)) shall accrue on the stipulated penalties determined by the District Court to be owing to the United States or the State. Within fifteen (15) days of receipt of the final appellate court decision, the Settling Defendants shall pay all accrued stipulated penalties and Interest (in accordance with Paragraph 19 (Interest)) determined to be owed by the Settling Defendants to the United States or the State.

85. United States' and State's Collection of Stipulated Penalties.

a. If the Settling Defendants fail to pay stipulated penalties when due, the United States or the State may institute proceedings to collect the penalties, as well as Interest in accordance with Paragraph 19 and the cost of enforcing the requirements of this Consent Decree, including attorney's fees. The Settling Defendants shall pay Interest on the unpaid balance of any stipulated penalty, which shall begin to accrue in accordance with Paragraph 19 (Interest).

b. Nothing in this Consent Decree shall be construed as prohibiting, altering, or in any way limiting the ability of the United States or the State to seek any other remedies or sanctions available by virtue of the Settling Defendants' violation of this Consent Decree or of the statutes and regulations upon which it is based, including, but not limited to, penalties pursuant to Section 122(l) of CERCLA; provided, however, that the United States shall not seek civil penalties pursuant to Section 122(l) of CERCLA for any violation for which a stipulated penalty is provided herein or for any violation excluded from stipulated penalties under Paragraph 80.b(i)-(ii) , except in the case of a willful violation of this Consent Decree. For any violation excluded from stipulated penalties under Paragraph 80.b(iii), the United States may only seek civil penalties pursuant to Section 122(l) of CERCLA after (i) it has provided written



notice to Settling Defendants of any such violation and provided Settling Defendants 60 days from the date the notice is received by the Settling Defendants to cure the violation or otherwise resolve the violation on terms acceptable to the Parties, and (ii) the Settling Defendants fail to cure or otherwise resolve the violation within the 60-day period.

86. Stipulated Penalty Waiver. Notwithstanding any other provision of this Section, the United States may, in its unreviewable discretion, waive any portion of stipulated penalties that have accrued pursuant to this Consent Decree.

## **XVII. COVENANTS AND RESERVATIONS BY THE UNITED STATES AND THE STATE**

87. Covenants to Settling Defendants.

a. United States' Covenant to the Settling Defendants. In consideration of the actions that will be performed and the payments that will be made by the Settling Defendants under the terms of this Consent Decree, and except as specifically provided in Paragraphs 89 (Pre-Certification Reservations), 90 (Post-Certification Reservations) and 92 (General Reservations of Rights) of this Section, the United States covenants not to sue or to take administrative action against the Settling Defendants, Indemnatee, any of the Settling Defendants' parent or affiliate corporations providing the financial assurances required under Section XII (Financial Assurance) of this Consent Decree, the subsidiaries of such parent or affiliate corporations, their respective officers, directors and employees, to the extent that the liability of such parent or affiliate companies, subsidiaries, officers, directors, and employees arises solely from their status as parent or affiliate companies, subsidiaries, officers, directors, and employees, pursuant to Sections 106, 107(a) and 113(f) of CERCLA, 42 U.S.C. §§ 9606, 9607(a) and 9613(f); Sections 3004(u) and (v), 3008 and 7003 of RCRA, 42 U.S.C. §§ 6924(u)



and (v), 6928 and 6973; and Sections 309(b), 311 and 504 of the Clean Water Act, 33 U.S.C. §§ 1319(b), 1321 and 1364 relating to the BPSOU, including claims or actions for Federal BPSOU Interim Response Costs, Oversight Costs for the BPSOU, or Federal BPSOU Future Response Costs. Notwithstanding the previous sentence, the United States' covenant to Settling Defendants does not include Railroad Properties and BPSOU Residential Solid Media Remedial Action, which is implemented as of the Effective Date through the RMAP. Provided, however, the United States acknowledges that Federal BPSOU Interim Response Costs and Oversight Costs for the BPSOU each include payments for Residential Solid Media Remedial Action prior to the Effective Date, and this covenant to Settling Defendants and Indemnitee includes claims or actions for Residential Solid Media Remedial Action costs that are Federal BPSOU Interim Response Costs or Oversight Costs for the BPSOU. As to BSB, these covenants do not extend to any of BSB's existing or future obligations under the Clean Water Act for activities or actions associated with the Metro Treatment Plant; for obligations relating to municipal stormwater control (except for stormwater control obligations within the BPSOU site boundary that are related to any contaminant of concern identified in Table 2-1 of Attachment A to the Statement of Work); or for any future point source discharges created or related to BSB's standard municipal functions. Except with respect to future liability, these covenants shall take effect upon the receipt by EPA of the payments required by Paragraphs 12 (Settling Defendants' Payment of Federal BPSOU Interim Response Costs) and 14 (Settling Defendants' Payment of Oversight Costs for the BPSOU) of Section VI (Payment of Response Costs). With respect to future liability, these covenants shall take effect upon Certification of RA Completion by EPA pursuant to Paragraph 4.7 of the SOW (Certification of RA Completion). These covenants are



conditioned upon the satisfactory performance by the Settling Defendants of their obligations under this Consent Decree. These covenants extend only to the Settling Defendants, Indemnatee, the Settling Defendants' parent or affiliate corporations providing the financial assurances required under Section XII (Financial Assurance) of this Consent Decree, the subsidiaries of such parent or affiliate corporations, and their respective officers, directors, and employees, and do not extend to any other person.

b. State's Covenant to Settling Defendants. In consideration of the actions that will be performed and the payments that will be made by the Settling Defendants under the terms of this Consent Decree, and except as specifically provided in Paragraphs 89 (Pre-Certification Reservations), 90 (Post-Certification Reservations) and 92 (General Reservations of Rights) of this Section, the State covenants not to sue or to take administrative action against the Settling Defendants, Indemnatee, the Settling Defendants' parent or affiliate corporations providing the financial assurances required under Section XII (Financial Assurance) of this Consent Decree, the subsidiaries of such parent or affiliate corporations, their respective officers, directors and employees, to the extent that the liability of such parent or affiliate companies, subsidiaries, officers, directors, and employees arises solely from their status as parent or affiliate companies, subsidiaries, officers, directors, and employees, pursuant to Sections 106, 107(a) and 113(f) of CERCLA, 42 U.S.C. §§ 9606, 9607(a) and 9613(f); Sections 3004(u) and (v), 3008 and 7002 of RCRA, 42 U.S.C. §§ 6924 (u) and (v), 6928 and 6972; Sections 309(a), 311, 504 and 505 of the Clean Water Act, 33 U.S.C. §§ 1319(a), 1321, 1364 and 1365; Sections 601, 602, 611, 613, 614 (except with respect to enforcement of an emergency order under 75-5-621), 615, 617, 631 and 635 of the Montana Water Quality Act, MCA §§ 75-5-601, 602, 611, 613, 614 (except



with respect to enforcement of an emergency order under MCA § 75-5-621), 615, 617, 631 and 635; Section 415 of the Montana Hazardous Waste Act, MCA § 75-10-415; and Sections 711, 715, 722 and 726 of CECRA, MCA §§ 75-10-711, 712, 722 and 726 relating to the BPSOU. Notwithstanding the previous sentence, the State's covenant to Settling Defendants does not include Railroad Properties and BPSOU Residential Solid Media Remedial Action, which is implemented as of the Effective Date through the RMAP. Provided, however, the State acknowledges that Federal BPSOU Interim Response Costs and Oversight Costs for the BPSOU each include payments for Residential Solid Media Remedial Action prior to the Effective Date, and this covenant to Settling Defendants and Indemnatee includes claims or actions for Residential Solid Media Remedial Action costs that are Federal BPSOU Interim Response Costs and Oversight Costs for the BPSOU. As to BSB, these covenants do not extend to any of BSB's existing or future obligations under the Clean Water Act or the Montana Water Quality Act for activities or actions associated with the Metro Treatment Plant; for obligations relating to municipal stormwater control (except for stormwater control obligations within the BPSOU site boundary that are related to any contaminant of concern identified in Table 2-1 of Attachment A to the SOW); or for any future point source discharges created or related to BSB's standard municipal functions. Except with respect to future liability, the covenants shall take effect upon the receipt by EPA of the payments required by Paragraph 12 (Settling Defendants Payment of Federal BPSOU Interim Response Costs) and 14 (Settling Defendants Payment of Oversight Costs for the BPSOU) and the receipt by the State of payments required by Paragraph 20 of Section VI (Payment of Response Costs). With respect to future liability, these covenants shall take effect upon Certification of RA Completion pursuant to Paragraph 4.7 of the SOW



(Certification of RA Completion). The covenants are conditioned upon the satisfactory performance by the Settling Defendants of their obligations under this Consent Decree. These covenants, as described in this Subparagraph, extend only to the Settling Defendants, Indemnitee, the Settling Defendants' parent or affiliate corporations providing the financial assurances required under Section XII (Financial Assurance) of this Consent Decree, the subsidiaries of such parent or affiliate corporations, their respective officers, directors, and employees, and do not extend to any other person.

88. Covenants for SFAs.

a. EPA Covenants for SFAs. Except as provided in Paragraphs 89 (Pre-Certification Reservations), 90 (Post-Certification Reservations), and 92 (General Reservations of Rights), EPA covenants not to take administrative action against SFAs pursuant to Sections 106, 107(a) and 113(f) of CERCLA, 42 U.S.C. §§ 9606, 9607(a) and 9613(f); Sections 3004(u) and (v), 3008 and 7003 of RCRA, 42 U.S.C. §§ 6924(u) and (v), 6928 and 6973; Sections 309(b), 311 and 504 of the Clean Water Act, 33 U.S.C. §§ 1319(b), 1321 and 1364 relating to the BPSOU (excluding Residential Solid Media Remedial Action outside the BPSOU). Except with respect to future liability, EPA's covenant shall take effect upon the Effective Date. With respect to future liability, EPA's covenant shall take effect upon Certification of RA Completion by EPA pursuant to Paragraph 4.7 of the SOW (Certification of RA Completion) of the SOW. EPA's covenant is conditioned upon the satisfactory performance by SFAs of their obligations under this Consent Decree. EPA's covenant extends only to SFAs and does not extend to any other person.



b. State Covenants for SFAs. Except as provided in Paragraphs 89 (Pre-Certification Reservations), 90 (Post-Certification Reservations) and 92 (General Reservations of Rights), the State covenants not to take any action pursuant to Sections 106, 107(a) and 113(f) of CERCLA, 42 U.S.C. §§ 9606, 9607(a) and 9613(f); Sections 3004(u) and (v), 3008 and 7002 of RCRA, 42 U.S.C. §§ 6924 (u) and (v), 6928 and 6972; Sections 309(a), 311, 504 and 505 of the Clean Water Act, 33 U.S.C. §§ 1319(a), 1321, 1364 and 1365; Sections 601, 602, 611, 613, 614, 615, 617, 631 and 635 of the Montana Water Quality Act, MCA §§ 75-5-601, 602, 611, 613, 614, 615, 617, 631 and 635; Section 415 of the Montana Hazardous Waste Act, MCA § 75-10-415; and Sections 711, 715, 722 and 726 of CECRA, MCA §§ 75-10-711, 715, 722 and 726 relating to the BPSOU (excluding Residential Solid Media Remedial Action outside the BPSOU). Except with respect to future liability, the State's covenant shall take effect upon the Effective Date. With respect to future liability, the State's covenant shall take effect upon Certification of RA Completion by EPA pursuant to Paragraph 4.7 (Certification of RA Completion) of the SOW.

89. Pre-certification Reservations.

a. United States' Pre-certification Reservations. Notwithstanding any other provision of this Consent Decree, the United States reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in this action as provided in this Consent Decree, or in a new action, or to issue an administrative order seeking to compel the Settling Defendants and/or the Indemnatee, and EPA reserves the right to issue an administrative order to compel SFAs:



(i) to perform further response actions relating to the BPSOU, and/or (ii) to reimburse the United States for additional costs of response relating to the BPSOU

if, prior to Certification of RA Completion:

(A) Conditions at the BPSOU, previously unknown to EPA, are discovered, or

(B) Information, previously unknown to EPA, is received, in whole or in part,

and EPA determines that these previously unknown conditions or information together with any other relevant information indicates that the Remedial Action is not protective of human health or the environment.

b. State's Pre-certification Reservations. Notwithstanding any other provision of this Consent Decree, the State reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in this action as provided in this Consent Decree, in a new action against the Settling Defendants and/or the SFAs and/or the Indemnatee, or in an administrative order seeking to compel the Settling Defendants and/or the Indemnatee:

(i) to perform further response actions relating to the BPSOU, and/or (ii) to reimburse the State for additional costs of response relating to the BPSOU

if, prior to Certification of RA Completion:

(A) Conditions at the BPSOU, previously unknown to the State, are discovered, or



(B) Information, previously unknown to the State, is received, in whole or in part, and the State determines that these previously unknown conditions or information together with any other relevant information indicates that the Remedial Action is not protective of human health or the environment.

90. Post-certification Reservations.

a. United States' Post-certification Reservations. Notwithstanding any other provision of this Consent Decree, the United States reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in this action pursuant to this Consent Decree, or in a new action, or to issue an administrative order seeking to compel the Settling Defendants and/or the Indemnitee, and EPA reserves the right to issue an administrative order to the SFAs:

(i) to perform further response actions relating to the BPSOU; and/or (ii) to reimburse the United States for additional costs of response relating to the BPSOU

if, subsequent to Certification of Completion of the Remedial Action:

(A) Conditions at the BPSOU, previously unknown to EPA, are discovered, or

(B) Information, previously unknown to EPA, is received, in whole or in part,

and EPA determines that these previously unknown conditions or this information together with other relevant information indicate that the Remedial Action is not protective of human health or the environment.



b. State's Post-certification Reservations. Notwithstanding any other provision of this Consent Decree, the State reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in this action pursuant to this Consent Decree, in a new action against Settling Defendants and/or SFAs and/or the Indemnatee, or in an administrative order seeking to compel the Settling Defendants and/or the Indemnatee:

(i) to perform further response actions relating to the BPSOU;  
and/or (ii) to reimburse the State for additional costs of response relating to the BPSOU

if, subsequent to Certification of Completion of the Remedial Action:

(A) Conditions at the BPSOU, previously unknown to the State,  
are discovered, or

(B) Information, previously unknown to the State, is received,  
in whole or in part,

and the State determines that these previously unknown conditions or this information together with other relevant information indicate that the Remedial Action is not protective of human health or the environment.

91. Information and Conditions Known.

a. Information and Conditions Known to the United States. For purposes of Subparagraph 89.a (United States' Pre-Certification Reservations), the information and the conditions known to EPA shall include only that information and those conditions known to EPA as of the date of lodging of this Consent Decree that are described or contained in: (1) the ROD; (2) all administrative records supporting the ROD; (3) the EPA Site Record as of the date of



lodging of the Consent Decree, except for risk assessment information related to lead and arsenic; and (4) the non-confidential or non-privileged EPA site record for the Butte Mine Flooding Operable Unit as of the date of lodging of the Consent Decree. For purposes of Subparagraph 90.a (United States' Post-Certification Reservations), the information and the conditions known to EPA shall include only that information and those conditions known to EPA as of EPA's acceptance of the Settling Defendants' Certification of RA Completion of the Remedial Action and described or contained in: (1) the ROD; (2) the administrative records supporting the ROD; (3) the EPA Site Record as of the date of the Certification of RA Completion for the BPSOU; (4) the non-confidential or non-privileged EPA site record for the Butte Mine Flooding Operable Unit Site as of the date of Certification of RA Completion for the BPSOU; and (5) any other information received or discovered by EPA pursuant to the requirements of this Consent Decree as of the date of the Certification of RA Completion. Information and conditions known to the United States does not include BPSOU-related, human health risk assessment information related to lead and arsenic received or discovered by EPA after the 2006 Record of Decision; provided, however, that for all such BPSOU-related, human health risk assessment information which is part of the BPSOU administrative records or EPA Site Record, Settling Defendants may dispute any proceeding in this action under Paragraphs 89 and 90 based on BPSOU-related, human health risk assessment information related to lead and arsenic in the BPSOU administrative records or EPA Site Record that is received or discovered by EPA or the State before or after the 2006 Record of Decision.

b. Information and Conditions Known to the State. For purposes of Subparagraph 89.b (State's Pre-Certification Reservations), the information and the conditions



known to the State shall include only that information and those conditions known to the State as of the date of lodging of this Consent Decree that are described or contained in: (1) the ROD; (2) the administrative records supporting the ROD; (3) the State Site Record as of the date of lodging of the Consent Decree, except for risk assessment information related to lead and arsenic; and (4) the non-confidential or non-privileged State site record for the Butte Mine Flooding Operable Unit Site as of the date of lodging of the Consent Decree; (5) the State site record for State Restoration and conduct of the Parrot Tailings Waste Removal; and (6) the files and records related to the State Action. For purposes of Subparagraph 90.b (State's Post-Certification Reservations), the information and the conditions known to the State shall include only that information and those conditions known to the State as of EPA's acceptance of the Settling Defendants' Certification of Completion of the Remedial Action and described or contained in: (1) the ROD; (2) the administrative records supporting the ROD; (3) the State Site Record as of the date of Certification of RA Completion for the BPSOU; (4) the non-confidential or non-privileged State site record for the Butte Mine Flooding Operable Unit Site as of the date of Certification of RA Completion for the BPSOU; (5) the State site record for State Restoration and conduct of the Parrot Tailings Waste Removal as of the date of Certification of RA Completion for the BPSOU; (6) the files and records related to the State Action; (7) any other information received or discovered by the State pursuant to the requirements of this Consent Decree as of the date of the Certification of RA Completion. Information and conditions known to the State does not include BPSOU-related, human health risk assessment information related to lead and arsenic received or discovered by the State or EPA after the 2006 Record of Decision; provided, however, that for all such BPSOU-related, human health risk assessment



information which is part of the BPSOU administrative records or State Site Record, Settling Defendants may dispute any proceeding in this action under Paragraphs 89 and 90 based on BPSOU-related, human health risk assessment information related to lead and arsenic in the BPSOU administrative records or State Site Record that is received or discovered by EPA or the State before or after the 2006 Record of Decision.

92. General Reservations of Rights.

a. United States' General Reservations of Rights. The covenants set forth in Paragraph 87 (Covenants to Settling Defendants) and Paragraph 88 (Covenants for SFAs) do not pertain to any matters other than those expressly specified in Paragraph 87 (Covenants to Settling Defendants) and Paragraph 88 (Covenants for SFAs). With respect to all other matters, the United States reserves, and this Consent Decree is without prejudice to, all rights against the Settling Defendants and/or the Indemnatee, and EPA reserves the right to issue an administrative order seeking to compel the SFAs to take action in certain circumstances, including, but not limited to, the following:

(i) Claims or actions to enforce this Consent Decree based on a failure by any Settling Defendant or SFA to meet a requirement of this Consent Decree;

(ii) Claims or actions for activities on Railroad Properties, which shall be brought in the Federal Action (but not under this Consent Decree), in an administrative order, or in a new action;

(iii) Liability for response costs and injunctive relief under CERCLA Sections 106, 107(a) and 113(f) of CERCLA, 42 U.S.C. §§ 9606,



9607(a) and 9613(f); and Sections 3004(u) and (v), 3008 and 7003 of RCRA, 42 U.S.C. §§ 6924(u) and (v), 6928 and 6973; Sections 309(b), 311 and 504 of the Clean Water Act, 33 U.S.C. §§ 1319(b), 1321 and 1364 arising from the past, present, or future disposal, release, or threat of release of Waste Materials outside of the BPSOU, other than as provided in the ROD or the Work. The “Continuation of Existing Migration” of contamination is not a release of Waste Materials outside of the BPSOU;

(iv) Liability for response costs and injunctive relief under CERCLA Sections 106, 107(a), and 113(f) of CERCLA, 42 U.S.C. §§ 9606, 9607(a) and 9613(f); and Sections 3004(u) and (v), 3008 and 7003 of RCRA, 42 U.S.C. §§ 6924(u) and (v), 6928, and 6973; Sections 309(b), 311 and 504 of the Clean Water Act, 33 U.S.C. §§ 1319(b), 1321 and 1364 for future acts of disposal of Waste Material at the BPSOU by the Settling Defendants or SFAs, other than as provided in the ROD, the Work, or for response actions otherwise ordered by EPA, and specifically excluding any claims for violations of existing or future permits under such statutes;

(v) Criminal liability;

(vi) Liability for violations of federal or state law by any Settling Defendant or SFAs or the Indemnatee which occur during or after implementation of the Work;

(vii) Liability, prior to Certification of Completion of the Remedial Action, for additional response actions that EPA determines are necessary to



achieve Performance Standards, but that cannot be required pursuant to Paragraph 27 (Modification of SOW or Related Deliverables by Settling Defendants) because they are outside the scope of the remedy selected in the ROD as defined in Paragraph 1.3 of the SOW (Appendix D). The rights reserved under this Subparagraph 92.a.(vii) shall be exercised only in a separate judicial proceeding in the Federal Action (but not under this Consent Decree) or a new action, or a new administrative order;

(viii) Liability for damages for injury to, destruction of, or loss of, natural resources and for the costs of assessing and litigating any claims for natural resource damages relating to the BPSOU against BSB; and

(ix) Liability for damages for injury to, destruction of, or loss of, natural resources and for the costs of assessing and litigating any claims for natural resource damages relating to the BPSOU against AR, but only to the extent such claims are reserved in Paragraph 114 of the Clark Fork Site Consent Decree or Paragraph 77 of the Streamside Tailings Consent Decree (the Streamside Tailings Consent Decree is described in Section I (Background) Paragraph F of this Consent Decree).

b. Notwithstanding any other provision of this Consent Decree, the United States reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in the Federal Action (but not under this Consent Decree), to file a new action, or to issue an administrative order seeking to compel the Settling Defendants and/or the Indemnatee to perform response actions and reimburse response costs related to Residential Solid Media Remedial



Action (excluding Oversight Costs), including, but not limited to, implementation of the RMAP on residential properties, and any modification after the Effective Date of the soil, dust, and/or vapor action levels set forth in the ROD. Any such modification to the soil, dust, and/or vapor action levels may only be lawfully required under a ROD amendment.

c. State's General Reservations of Rights. The covenants set forth in Paragraph 87 (Covenants to Settling Defendants) and Paragraph 88 (Covenants for SFAs) do not pertain to any matters other than those expressly specified in Paragraph 87 (Covenants to Settling Defendants) and Paragraph 88 (Covenants for SFAs). With respect to all other matters, the State reserves, and this Consent Decree is without prejudice to all rights against the Settling Defendants or SFAs and/or the Indemnatee, including but not limited to the following:

(i) Claims or actions to enforce this Consent Decree based on a failure by the Settling Defendants or SFAs to meet a requirement of this Consent Decree;

(ii) Claims or actions for activities on Railroad Properties, which shall be brought in the Federal Action (but not under this Consent Decree), in an administrative order, or in a new action;

(iii) Liability for response costs and injunctive relief under CERCLA Sections 106, 107, and 9613(f), 42 U.S.C. §§ 9606, 9607(a) and 9613(f); Sections 3004(u) and (v), 3008 and 7002 of RCRA, 42 U.S.C. §§ 6924 (u) and (v), 6928 and 6972; Sections 309(a), 311, 504 and 505 of the Clean Water Act, 33 U.S.C. §§ 1319(a), 1321, 1364 and 1365; Sections 601, 602, 611, 613, 614, 615, 617, 631 and 635 of the Montana Water Quality Act, MCA §§ 75-5-



601, 602, 611, 613, 614, 615, 617, 631 and 635; Section 415 of the Montana Hazardous Waste Act, MCA § 75-10-415; Sections 711, 715, 722 and 726 of CECRA, MCA §§ 75-10-711, 715, 722 and 726 arising from the past, present, or future disposal, release, or threat of release of Waste Materials outside of the BPSOU, other than as provided in the ROD or the Work. The “Continuation of Existing Migration” of contamination is not a release of Waste Materials outside of the BPSOU;

(iv) Liability for response costs and injunctive relief under CERCLA Sections 106, 107, and 9613(f), 42 U.S.C. §§ 9606, 9607(a) and 9613(f); Sections 3004(u) and (v), 3008 and 7002 of RCRA, 42 U.S.C. §§ 6924 (u) and (v), 6928 and 6972; Sections 309(a), 311, 504 and 505 of the Clean Water Act, 33 U.S.C. §§ 1319(a), 1321, 1364 and 1365; Sections 601, 602, 611, 613, 614, 615, 617, 631 and 635 of the Montana Water Quality Act, MCA §§ 75-5-601, 602, 611, 613, 614, 615, 617, 631 and 635; Section 415 of the Montana Hazardous Waste Act, MCA § 75-10-415; Sections 711, 715, 722 and 726 of CECRA, MCA §§ 75-10-711, 715, 722 and 726 for future acts of disposal of Waste Material at the BPSOU by the Settling Defendants or SFAs, other than as provided in the ROD, the Work, or otherwise ordered by EPA, and specifically excluding any claims for violations of existing or future permits under such statutes;

(v) Criminal liability;



(vi) Liability for violations of federal or state law by any Settling Defendant or SFAs or the Indemnatee which occur during or after implementation of the Work;

(vii) Liability, prior to Certification of Completion of the Remedial Action, for additional response actions that the State determines are necessary to achieve Performance Standards, but that cannot be required pursuant to Paragraph 27 (Modification of SOW and Related Deliverables by Settling Defendants) because they are outside the scope of the remedy selected in the ROD and as defined in Paragraph 1.3 of the SOW (Attachment D). The rights reserved under this Subparagraph 92.c.(vii) shall be exercised only in a separate judicial proceeding in the Federal Action (but not under this Consent Decree) or a new action, or a new administrative order;

(viii) Liability for damages for injury to, destruction of, or loss of, natural resources and for the costs of assessing and litigating any claims for natural resource damages relating to the BPSOU against BSB;

(ix) Liability for damages for injury to, destruction of, or loss of, natural resources and for the costs of assessing and litigating any claims for natural resource damages and other liability relating to the BPSOU against AR, but only to the extent such claims are reserved in consent decrees previously entered in the State Action; and



(x) Any claim, defense or counterclaim by the State against AR related to Subparagraphs 96.f and 96.g (Settling Defendants' Reservation of Rights); and

(xi) the right to seek from this Court an award of any costs, fees or damages (including reasonable attorney's fees) incurred by State resulting or arising from such claims or causes of action reserved in Paragraph 92.c.(x).

d. Notwithstanding any other provision of this Consent Decree, the State reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in the Federal Action (but not under this Consent Decree), to file a new action, or to issue an administrative order seeking to compel the Settling Defendants and/or the Indemnatee to perform response actions and reimburse response costs related to Residential Solid Media Remedial Action (excluding Oversight Costs), including, but not limited to, implementation of the RMAP on residential properties and any modification after the Effective Date of the soil, dust, and/or vapor action levels set forth in the ROD. Any such modification to the soil, dust, and/or vapor action levels may only be lawfully required under a ROD amendment.

93. Work Takeover

a. In the event EPA, in consultation with DEQ, determines that the Settling Defendants have (i) ceased implementation of any portion of the Work, are (ii) are seriously or repeatedly deficient or late in their performance of the Work, or (iii) are implementing the Work in a manner which may cause an endangerment to human health or the environment, EPA may issue a "Work Takeover Notice" to the Settling Defendants. Any Work Takeover Notice issued by EPA will specify the grounds upon which such notice was issued and will provide the Settling



Defendants a period of 30 days within which to remedy the circumstances giving rise to EPA's issuance of such notice.

b. If, after expiration of the 30 day notice period specified in Subparagraph 93.a, the Settling Defendants have not remedied to EPA's satisfaction the circumstances giving rise to EPA's issuance of the relevant Work Takeover Notice, EPA may at any time thereafter assume the performance of all or any portions of the Work as EPA deems necessary ("Work Takeover"). EPA shall notify the Settling Defendants in writing (which writing may be electronic) if EPA determines that implementation of a Work Takeover is warranted under this Subparagraph 93.b.

c. The Settling Defendants may invoke the procedures set forth in Section XV (Dispute Resolution), Paragraph 75 (Record Review) to dispute EPA's implementation of a Work Takeover under Subparagraph 93.b. However, notwithstanding the Settling Defendants' invocation of such dispute resolution procedures, and during the pendency of any such dispute, EPA, in consultation with DEQ, may in its sole discretion commence and continue a Work Takeover under Subparagraph 93.b until the earlier of (i) the date that the Settling Defendants remedy, to EPA's satisfaction, the circumstances giving rise to EPA's issuance of the relevant Work Takeover Notice, or (ii) the date that a final decision is rendered in accordance with Section XV (Dispute Resolution), Paragraph 75 (Record Review) requiring EPA to terminate such Work Takeover.

d. After commencement and for the duration of any Work Takeover, EPA shall have immediate access to and benefit of any financial assurance mechanism provided pursuant to Section XII (Financial Assurance), pursuant to the terms of said form of performance



guarantee and pursuant to Paragraph 61 (Access to Financial Assurance) of that Section. Any unreimbursed costs incurred by EPA in performing Work under the Work Takeover shall be considered BPSOU Future Response Costs that the Settling Defendants shall pay pursuant to Section VI (Payment of Response Costs).

**XVIII. COVENANTS AND RESERVATIONS BY SETTling  
DEFENDANTS AND SFAS**

94. Settling Defendants' Covenants.

a. Settling Defendants' Covenant Not to Sue the United States. Subject to the reservations in Paragraph 96 (Settling Defendants' Reservation of Rights), each Settling Defendant hereby covenants not to sue and agrees not to assert any past, present, or future claims or causes of action against the United States, its agencies, instrumentalities, officials, employees, agents, and contractors relating to the BPSOU, as defined herein, including:

(i) Any direct or indirect claim related to the BPSOU for reimbursement from the Hazardous Substance Superfund (established pursuant to the Internal Revenue Code, 26 U.S.C. § 9507) through CERCLA Sections 106(b)(2), 107, 111, 112, 113 or any other provision of law;

(ii) Any claims under CERCLA Sections 107 or 113, 42 U.S.C. §§ 9607 and 9613; under RCRA Sections 3004(u) and (v), 3008 and 7002, 42 U.S.C. §§ 6924(u) and (v), 6928 and 6972; under Section 311, 504 and 505 of the Clean Water Act, 33 U.S.C. §§ 1321, 1364 and 1365; or under CECRA, including Sections 711, 715, 719, 722, 724 and 726, MCA §§ 75-10-711, 75-10-715, 75-10-719, 75-10-722, 75-10-724, 75-10-726 and any other theory of recovery or



provision of law relating to the BPSOU (excluding Residential Solid Media Remedial Action); or

(iii) Any claims arising out of response activities at the BPSOU, including claims based on EPA's selection of response actions, oversight of response activities, or approval of plans for such activities, including any claim under the United States Constitution, the State of Montana Constitution, the Tucker Act, 28 U.S.C. § 1491, the Equal Access to Justice Act, 28 U.S.C. § 2412, or at common law.

b. Settling Defendants' Covenant Not to Sue the State. Subject to the reservations in Paragraph 96 (Settling Defendants' Reservation of Rights), each Settling Defendant hereby covenants not to sue and agrees not to assert any past, present, or future claims or causes of action against the State, its agencies, instrumentalities, officials, employees, agents, and contractors relating to the BPSOU, as defined herein, including:

(i) Any direct or indirect claim for reimbursement or funding under State law, including any direct or indirect claim related to the BPSOU for reimbursement from the Environmental Quality Protection Fund (established pursuant to MCA 75-10-704), the Orphan Share Account (established pursuant to MCA 75-10-743), or any other provision of law;

(ii) Any claims under CERCLA Sections 107 or 113, 42 U.S.C. Sections 9607 and 9613; under RCRA Sections 3004(u) and (v), 3008 and 7002, 42 U.S.C. §§ 6924(u) and (v), 6928 and 6972; under Sections 311, 504 and 505 of the Clean Water Act, 33 U.S.C. §§ 1321, 1364 and 1365; or under CECRA,



including Sections 711, 715, 719, 722, 724 and 726, MCA §§ 75-10-711, 75-10-715, 75-10-719, 75-10-722, 75-10-724, 75-10-726 and any other theory of recovery or provision of law relating to the BPSOU (excluding Residential Solid Media Remedial Action); or

(iii) Any claims arising out of response activities at the BPSOU, including claims based on selection of response actions, oversight of response activities, or approval of plans for such activities including any claim under the United States Constitution, the State of Montana Constitution, the Tucker Act, 28 U.S.C. § 1491, the Equal Access to Justice Act, 28 U.S.C. § 2412, or at common law.

95. Covenant by SFAs.

a. SFA's Covenants to EPA. SFAs except for EPA agree not to assert any direct or indirect claim for reimbursement from the EPA Hazardous Substance Superfund through CERCLA §§ 106(b)(2), 107, 111, 112 or 113 or any other provision of law with respect to the BPSOU and this Consent Decree. This covenant does not preclude demand for reimbursement from the Superfund of costs incurred by a SFA in the performance of its duties (other than pursuant to this Consent Decree) as lead or support agency under the NCP.

b. SFA's Covenants to State. Subject to the reservations in Paragraph 97 (SFA's Reservation of Rights) and except for the rights of EPA (subject to the Dispute Resolution provisions of Paragraph 33) to require the State to comply with the State's obligations to implement the BTC Riparian Actions as set forth in the BTC Riparian Actions Remedial Action Work Plans pursuant to this Consent Decree, the SFAs hereby covenant not to sue and



agree not to assert any of the following claims or causes of action against the State, its agencies, instrumentalities, officials, employees, agents, and contractors arising in the past, present or future relating to the BTC Riparian Actions:

(1) Any direct or indirect claim for reimbursement or funding under State law, including any direct or indirect claim for reimbursement from the Environmental Quality Protection Fund (established pursuant to MCA 75-10-704), the Orphan Share Account (established pursuant to MCA 75-10-743), or any other provision of law; and

(2) Any claims under CERCLA Sections 106, 107 or 113, 42 U.S.C. Sections 9606, 9607 and 9613; under RCRA Sections 3004(u) and (v), 3008 and 7002, 42 U.S.C. §§ 6924(u) and (v), 6928, and 6972; under Section 309(b), 311, 504 and 505 of the Clean Water Act, 33 U.S.C. §§ 1319(b), 1321, 1364 and 1365; or under CECRA, including Sections 711, 715, 719, 722, 724 and 726, MCA 75-10-711, 75-10-715, 75-10-719, 75-10-722, 75-10-724, 75-10-726.

96. Settling Defendants' Reservation of Rights. The Settling Defendants reserve, and this Consent Decree, is without prejudice to:

a. Claims against the United States, subject to the provisions of Chapter 171 of Title 28 of the United States Code, and claims against the State under Chapter 9 of Title 2 of Montana Code Annotated for money damages for injury or loss of property or personal injury or death caused by the negligent or wrongful act or omission of any employee of the United States or the State while acting within the scope of his office or employment under circumstances where the United States or the State, if a private person, would be liable to the claimant in



accordance with the law of the place where the act or omission occurred. However, any such claim shall not include a claim for any damages caused, in whole or in part, by the act or omission of any person, including any contractor, who is not a federal employee as that term is defined in 28 U.S.C. § 2671, or an employee, as that term is defined in 2-9-101, MCA; nor shall any such claim include a claim based on EPA's selection of response actions that may be required under this Consent Decree, the State's commitment to perform BTC Remedial Actions, or the oversight or approval of the Settling Defendants' plans or activities. The foregoing applies only to claims which are brought pursuant to any Federal or State statute other than CERCLA or CECRA and for which the waiver of sovereign immunity is found in a statute other than CERCLA or CECRA.

b. As to AR only, in the event the United States or the State initiates a new claim, new action, or administrative order seeking to compel AR to perform and/or pay for further response actions pursuant to the reservations of the United States and the State under Paragraph 89 (Pre-Certification Reservations), Paragraph 90 (Post-Certification Reservations), or Paragraph 92 (General Reservations of Rights) (excluding Subparagraphs 92.a.(i) (claims for failure to meet a requirement of the Consent Decree), 92.a.(iv) (criminal liability), and 92.a.(v) (violations of federal/state law during or after implementation of the Work) (collectively the "Reserved Claims"), then AR reserves the defenses, contribution claims, counterclaims and other claims that AR reserved in and did not settle under paragraph 20 of the Past Costs Consent Decree, including, but not limited to, contribution claims against any person or entity not a party to the Past Costs Consent Decree, but only for those defenses, contribution claims, counterclaims and other claims arising from the same matters, transactions, or occurrences that are raised in or



directly related to the United States' or the States' Reserved Claims against AR. The United States acknowledges that the cost caps contained in paragraph 20 of the Past Costs Consent Decree were exceeded prior to the Effective Date of this Consent Decree;

c. As to BSB only, in the event the United States or State initiates a new claim, new action or administrative order seeking to compel BSB to perform and/or pay for further response actions pursuant to the reservations of the United States and the State under Paragraph 89 (Pre-Certification Reservations), Paragraph 90 (Post-Certification Reservations), or Paragraph 92 (General Reservations of Rights) (excluding Subparagraphs 92.a.(i) (claims for failure to meet a requirement of the Consent Decree), 92.a.(iv) (criminal liability), and 92.a.(v) (violations of federal/state law during or after implementation of the Work) (collectively the "Reserved Claims"), then BSB reserves any defenses, contribution claims, counterclaims and other claims including, but not limited to, contribution claims against AR, the Settling Federal Agencies, the State, and/or owners and operators of Railroad Property, and/or any person or entity not a party to this Consent Decree, but only for those defenses, contribution claims, counterclaims and other claims arising from the same matters, transactions, or occurrences that are raised in or directly related to the United States' or the State's Reserved Claims against BSB;

d. As to AR only, any claim, defense, or counterclaim by AR against the State which is expressly reserved in a consent decree previously entered in the State Action;

e. As to AR only, any defenses to any claim by the United States or the State for civil penalties under Section 109 or 122(l) of CERCLA, 42 U.S.C. §§ 9609, 9622(l), but only



for defenses arising from the same matters, transactions, or occurrences that are raised in or directly related to the United States' claims or the State's claims against AR in such an action.

f. AR's reservation of certain claims, defenses, and causes of action against the State under CERCLA, CECRA, and any other federal or state law, including common law, as further described herein ("Restoration Reservation"). The Restoration Reservation applies to actions performed by the State that cause (in whole or in part) EPA to require additional remedial action and/or AR to perform remedial action that is approved by EPA to satisfy any AR obligation under this Consent Decree or to ensure the protectiveness of the Remedy, thereby causing AR to incur the additional response costs, fees, or damages listed below:

(i) To recover response costs, fees, or damages associated with repair or maintenance of the Subdrain required to address conditions caused (in whole or in part) by the Parrot Tailings Waste Removal Project, but only for the State's allocable share of such costs, fees or damages that AR incurs following implementation of Subdrain optimization, as described in Attachment B.1 (Section 2.2.2.1) and Attachment C to the SOW. The parties agree that the costs and damages that are reserved in this Paragraph are solely for repair or maintenance and do not include any capital expenditures on any remedial component of the Subdrain.

(ii) To recover response costs, fees, or damages for remedial action at the Butte Treatment Lagoons (BTL) required to address the following conditions caused by or attributable (in whole or in part) to the Parrot Tailings Waste Removal Project, but only for the State's allocable share of such additional costs, fees or damages arising from or related to:



(A) an increase in concentration of any contaminant of concern in groundwater that was treated at the BTL as of the Effective Date of this Consent Decree; and/or

(B) the introduction of a new contaminant of concern in groundwater treated at the BTL that was not treated at the BTL as of the Effective Date of this Consent Decree; and/or

(C) an increase in the quantity of water captured for treatment at the BTL in a volume greater than that treated at the BTL as of the Effective Date of this Consent Decree

(iii) To recover response costs, fees, or damages for remedial action at the BPSOU to address adverse impacts to the Remedy caused (in whole or in part) by any State Restoration project funded by payments made to the State under Paragraph 20 of this Consent Decree and described in Paragraph 21 of this Consent Decree (other than the Parrot Tailings Waste Removal Project), but only for the State's allocable share of such additional costs, fees, or damages arising from or related to such adverse impacts to the Remedy.

(iv) To seek from this Court and recover an award of any costs, fees or damages (including reasonable attorney's fees) incurred by AR resulting or arising from any such claims or causes of action reserved in this Subparagraph 96.f. and Subparagraph 96.g.



g. The following limitations apply to the Restoration Reservation in Paragraph 96.f:

(i) AR's reservation of rights to bring a claim, defense, or cause of action against the State pursuant to Paragraph 96.f is only triggered if AR has or will incur \$1 million in response costs, fees, or damages under one or more of the claims, defenses, or causes of action enumerated in Paragraph 96.f.

(ii) In asserting any claim, defense, or cause of action reserved in Paragraph 96.f, AR shall have the burden of proof.

(iii) Any claim, defense, or cause of action asserted by AR against the State pursuant to Paragraph 96.f.(i)-(ii) must be brought within five years after the later of the following occurrences: (1) the State's issuance of a final project completion report for the Parrot Tailings Waste Removal Project; or (2) the State's completion of all Parrot Tailings Waste Removal Project-related activities, including any interim groundwater pumping, other than Project-area monitoring. Any claim, defense, or cause of action asserted by AR against the State pursuant to Paragraph 96.f.(iii) must be brought within five years after the later of the following occurrences: (1) the State's issuance of a final project completion report for the State Restoration project that is the subject of AR's claim; or (2) the State's completion of all project-related activities other than monitoring for the State Restoration project that is the subject of AR's claim.

h. The State's intervention in this matter serves to waive State sovereign immunity against future claims, defenses, and causes of action and rights asserted by AR against the State in this Court pursuant to AR's enumerated reservations in this Consent Decree. By



intervening as a plaintiff in this action, the State of Montana and its State signatories acknowledge that the State has waived the State's sovereign immunity from future suit, including waiving any immunity the State might have under the Eleventh Amendment against suit in this Court. On behalf of and for the State of Montana, the State signatories to this Consent Decree further affirm and agree they knowingly and voluntarily consent to future suit in this Court, and consents to the jurisdiction of this Court, for resolution of the potential future claims, defenses, or causes of action reserved under this Consent Decree, and agree that the State is estopped from raising, and will not attempt to raise, any immunity defense in such a future suit (including a defense under the Eleventh Amendment) or raise any objection to this Court's jurisdiction, and consents and agrees that this Court may, and will, dismiss and reject any attempt to raise such an immunity defense or objection to jurisdiction or venue in the event such future suit is brought by AR against the State, as reserved under this Consent Decree.

i. For purposes of this Paragraph, the Parties agree:

(A) As of the Effective Date, the BTL treats the following contaminants of concern in collected groundwater: cadmium, copper, lead, and zinc present in influent to the BTL in concentrations that exceed BTL Performance Standards. The BTL treatment system, a passive water treatment system that settles out contaminants following lime addition, also removes lesser concentrations of other substances, including aluminum, arsenic, barium, (total) boron, fluoride, iron, mercury, nitrogen compounds, silver, sulfate and uranium-238.



(B) As of the Effective Date, the State is pumping 100 gallons per minute from the groundwater system at the Parrot Tailings Waste Removal Project area; the Parties agree that the State's cessation of groundwater pumping and withdrawal of groundwater from the Parrot Tailings Waste Removal Project area will not be an "increase in the quantity of water captured for treatment at the BTL" under Paragraph 96.f.(ii)(C).

(C) Reduced concentrations of contaminants in groundwater entering the Subdrain cannot be used as a basis for a claim under Paragraph 96.f.

(D) AR and the State will each timely provide the other with all data and other information received or generated at the BPSOU after the Effective Date that may be relevant to any claim, defense, or cause of action under Paragraph 96.f.

97. SFAs' Reservation of Rights For State Claims. The SFA's reserve, and this Consent Decree, is without prejudice to, any defenses and claims of the SFAs in the event the State brings a cause of action or issues an order pursuant to any of the reservations under Paragraph 89 (Pre-Certification Reservations), Paragraph 90 (Post-Certification Reservations), or Paragraph 92 (General Reservations of Rights), other than in Subparagraphs 92.c.(i) (claims for failure to meet a requirement of the Consent Decree), 92.c.(iv) (criminal liability), and 92.c.(v) (violations of federal/state law during or after implementation of the Work), but only to the extent that the SFAs' defenses or claims arise from the same response action, response costs, or damages that the State is seeking pursuant to the applicable reservation.



98. Preauthorization. Nothing in this Consent Decree shall be deemed to constitute approval or preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. § 300.700(d).

99. Waiver of Claims. The Settling Defendants individually or as a whole or partial group agree not to assert any claims and to waive all CERCLA, CECRA, and RCRA claims or causes of action that they may have for all matters relating to the BPSOU, including for contribution, against any person where the person's liability to the Settling Defendants with respect to the BPSOU is based solely on having arranged for disposal or treatment, or for transport for disposal or treatment, of hazardous substances at the BPSOU, or having accepted for transport for disposal or treatment of hazardous substances at the BPSOU, if the materials contributed by such person to the BPSOU containing hazardous substances did not exceed the greater of: (A) 0.002% of the total volume of waste at the BPSOU, or (B) 110 gallons of liquid materials or 200 pounds of solid materials. This waiver shall not apply to any claim or cause of action against any person meeting the above criteria if EPA has determined that the materials contributed to the BPSOU by such person contributed or could contribute significantly to the costs of response at the BPSOU, or if EPA has named such parties as potentially responsible parties for the BPSOU pursuant to Section 107 of CERCLA, 42 U.S.C. § 9607. This waiver shall also be void to the extent that the United States or the State institutes new claims in the Federal Action (but not under this Consent Decree) or a new action, or issues a new administrative order to the Settling Defendants, pursuant to Subparagraphs 92.a.(vii), 92.b, 92.c.(vii), or 92.d (General Reservations of Rights) of this Consent Decree. In addition, this waiver and agreement not to assert claims also shall not apply with respect to any defense, claim,



or cause of action that a Settling Defendant may have against any person if such person asserts a claim or cause of action relating to the BPSOU against any Settling Defendant, or if legal action to enforce any Remedy requirement, including Institutional Controls (to support the ICIAP, Appendix E to this Consent Decree) is filed in this action.

#### **XIX. EFFECT OF SETTLEMENT; CONTRIBUTION PROTECTION**

100. Effect on Nonparties. Except as provided in Paragraphs 87 (Covenants to Settling Defendants) and 99 (Waiver of Claims), nothing in this Consent Decree shall be construed to create any rights in, or grant any cause of action to, any person not a Party to this Consent Decree. The preceding sentence shall not be construed to waive or nullify any rights that any person not a signatory to this Consent Decree may have under applicable law. Except as provided in Paragraph 99 (Waiver of Claims), each of the Parties expressly reserves any and all rights (including, but not limited to, any right to contribution), defenses, claims, demands, and causes of action which each Party may have with respect to any matter, transaction, or occurrence relating in any way to the matters addressed in this Consent Decree against any person not a Party hereto. Nothing in this Consent Decree diminishes the right of the United States or the State, pursuant to Section 113(f)(2) and (3) of CERCLA, 42 U.S.C. § 9613(f)(2) and (3), to pursue any such persons to obtain additional response costs or response action and to enter into settlements that give rise to contribution protection pursuant to Section 113(f)(2).

101. Contribution Protection. By entering this Consent Decree this Court finds that this Consent Decree constitutes a judicially-approved settlement pursuant to which the State, each Settling Defendant, the Indemnatee, and each Settling Federal Agency has, as of the Effective Date, resolved liability to the United States within the meaning of Section 113(f)(2) of CERCLA, 42 U.S.C. § 9613(f)(2) and/or Section 719(1) of CECRA, 75-10-719(1), and is entitled, as of the



Effective Date, to protection from contribution actions or claims as provided by Section 113(f)(2) of CERCLA, Section 719(1) of CECRA, or as may be otherwise provided by law, for the “matters addressed” in this Consent Decree. For purposes of this Paragraph, the “matters addressed” in this Consent Decree as to all Parties and the Indemnitee include: the Federal BPSOU Interim Response Costs, Federal BPSOU Future Response Costs, Oversight Costs for the BPSOU, Work, State Restoration at the BPSOU, including the Parrot Tailings Waste Removal, BTC Riparian Actions, as well as all approved response actions at the BPSOU taken and to be taken by any Party pursuant to this Consent Decree. As to the United States and the State, the “matters addressed” in this Consent Decree also includes: response actions taken or to be taken on Railroad Properties and the implementation of the Residential Solid Media Remedial Action within the BPSOU as defined in the 2006 Record of Decision, the 2011 ESD, and the 2020 Record of Decision Amendment (excluding Residential Solid Media Remedial Action outside the BPSOU). The contribution protection set forth in this Paragraph is intended to provide the broadest protection afforded by CERCLA and CECRA for matters addressed in this Consent Decree.

102. The Parties further agree, and by entering this Consent Decree this Court finds, that the complaints filed by the United States and the State in this action is a civil action within the meaning of Section 113(f)(1) of CERCLA, 42 U.S.C. § 9613(f)(1), and that this Consent Decree constitutes a judicially-approved settlement pursuant to which each Settling Defendant and each SFA has, as of the Effective Date, resolved liability to the United States within the meaning of Section 113(f)(3)(B) of CERCLA, 42 U.S.C. § 9613(f)(3)(B).



103. Notification. Each Settling Defendant(s) agrees that with respect to any suit or claim for contribution brought by any one of them for matters related to this Consent Decree, they will notify the United States and the State in writing no later than sixty (60) days prior to the initiation of such suit or claim. The Settling Defendants agree that with respect to any suit or claim for contribution brought against any one of them for matters related to this Consent Decree, they will notify in writing the United States and the State within ten (10) days of service of the complaint on any Settling Defendant. In addition, the Settling Defendants shall notify the United States and the State within ten (10) days of service or receipt of any motion for summary judgment and within ten (10) days of receipt of any order from a court setting a case for trial.

104. Waiver of Claim-Splitting Defenses.

a. In any subsequent administrative or judicial proceeding initiated by (i) the United States or the State for injunctive relief, recovery of response costs, or other appropriate relief relating to the BPSOU or any of the remaining Operable Units within the Clark Fork NPL Sites, or (ii) the United States or the State for other claims reserved in Paragraph 89 (Pre-Certification Reservations), 90 (Post-Certification Reservations), and 92 (General Reservations of Rights), the Settling Defendants shall not assert, and may not maintain, any defense or claim based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, claim-splitting, or other defenses based upon any contention that the claims raised in the subsequent proceeding by the United States or the State were or should have been brought in the Federal Action or in the State Action; provided, however, that nothing in this Paragraph affects the enforceability of the covenants not to sue set forth in Section XVII (Covenants and Reservations by the United States and the State).



b. In any subsequent administrative or judicial proceeding initiated by the United States or the State, for injunctive relief, recovery of response costs, or other appropriate relief relating to the BPSOU, neither the United States nor the State, shall use any provision of this Consent Decree to assert and maintain any defense or claim based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, claim-splitting, or other defenses based upon any contention that the claims raised by the Settling Defendants in the subsequent proceeding were or should have been brought in the Federal Action or in the State Action; provided, however, that nothing in this Paragraph affects the enforceability of the covenants not to sue set forth in Section XVIII (Covenants and Reservations by the Settling Defendants).

## **XX. ACCESS TO INFORMATION**

105. Obligation to Provide Documents. Subject to the assertion of privilege claims in accordance with Paragraph 106 (Claims of Privilege), the Settling Defendants shall each provide to EPA and the State, upon request, copies of all documents and information within its possession or control or that of its contractors or agents relating to the BPSOU or to the implementation of this Consent Decree, including, but not limited to, sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, and correspondence; provided, however, that the Settling Defendants shall not be required to re-produce any documents already provided to the United States. In response to reasonable requests by EPA, in consultation with the State, the Settling Defendants shall cooperate in making available to EPA and the State, for purposes of investigation, information gathering, or testimony, its employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work, subject to their right to counsel or any other right under State and Federal law.



106. Claims of Privilege.

a. A Settling Defendant may assert business confidentiality claims covering part or all of the documents or information submitted to the United States, EPA, or the State under this Consent Decree to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and 40 C.F.R. § 2.203(b). Documents or information determined to be confidential by EPA will be afforded the protection specified in 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality accompanies documents or information when they are submitted to the United States, EPA, or the State, and if EPA has notified the Settling Defendant asserting such a claim that the documents or information are not confidential under the standards of Section 104(e)(7) of CERCLA, the public may be given access to such documents or information without further notice to the Settling Defendants.

b. Each Settling Defendant may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by state or federal law. If any Settling Defendant asserts such a privilege in lieu of providing documents over which it asserts a privilege, and if that Settling Defendant has not previously provided a privilege log to the United States for the documents subject to the request, that Settling Defendant shall provide the United States and/or EPA, and the State, with the following: (1) the title of the document, record, or information; (2) the date of the document, record, or information; (3) the name and title of the author of the document, record, or information; (4) the name and title of each addressee and recipient; (5) a description of the contents of the document, record, or information; and (6) the privilege asserted by the Settling Defendant. However, no documents, reports or other information the Settling Defendants are



required to create or generate by this Consent Decree shall be withheld on the grounds that they are privileged.

107. No Data Claim. No claim of confidentiality shall be made by any Party with respect to any data, including, but not limited to, all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, or engineering data, or any other non-privileged documents or information evidencing conditions relating to the BPSOU.

108. Previously Provided Documents. Nothing in this Section shall require the Settling Defendants to produce any documents, records, or other information that any Settling Defendant(s) have previously produced to the United States, although the Settling Defendants shall cooperate with the United States to identify the approximate date(s) of such previous production or other information to assist the United States in locating previously produced documents.

109. Admissibility. If relevant to the proceeding, the Parties agree that validated sampling or monitoring data generated in accordance with the SOW and reviewed and approved by EPA shall be admissible as evidence, without objection, in any proceeding under this Consent Decree.

110. Plaintiffs Retention of Rights. Notwithstanding any provision of this Consent Decree, Plaintiffs retain all of their information gathering and inspection authorities and rights, including enforcement actions related thereto, under CERCLA, RCRA, and any other applicable statutes or regulations.

## **XXI. RETENTION OF RECORDS**

111. Preservation of Records. Until 5 years after the Settling Defendants' receipt of EPA's last notification pursuant to Paragraph 4.9 of SOW (Certification of Work Completion),



each Settling Defendant shall preserve and retain all non-identical records and documents (including records or documents in electronic form) now in their possession or control or which come into their respective possession or control that relate to the BPSOU Work or liability of any person for response actions conducted and to be conducted at the BPSOU, regardless of any corporate retention policy to the contrary. The Settling Defendants shall each also instruct their contractors and agents to preserve for the same period of time all documents and records relating to the performance of the Work at the BPSOU.

112. Notification. At the conclusion of this document retention period, each Settling Defendant shall notify the United States and the State at least ninety (90) days prior to the destruction of any such records or documents. A Settling Defendant may assert that certain documents, records, and other information are privileged under the attorney-client privilege or any other privilege recognized by state or federal law. If a Settling Defendant asserts such a privilege, it shall provide the United States and the State with the following: (1) the title of the document, record, or information; (2) the date of the document, record, or information; (3) the name and title of the author of the document, record, or information; (4) the name and title of each addressee and recipient; (5) a description of the subject of the document, record, or information; and (6) the privilege asserted by the Settling Defendant. However, no final documents, reports or other information created or generated pursuant to the requirements of this Consent Decree shall be withheld on the grounds that they are privileged.

113. Certification. The Settling Defendants each hereby certify that, to the best of their knowledge and belief, after thorough inquiry, they have not altered, mutilated, discarded, destroyed or otherwise disposed of any records, documents or other information relating to their



potential liability or the potential liability of any other Settling Defendant regarding the BPSOU since the notification of potential liability by the United State or the State, and that they have fully complied with any and all EPA requests for information pursuant to Section 104(e) and 122(e)(3)(b) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e)(3)(b), and Section 3007 of RCRA, 42 U.S.C. § 6927 and state law.

114. SFA Acknowledgement. The United States acknowledges that each SFA (a) is subject to all applicable federal record retention laws, regulations, and policies; and (b) has certified that it has fully complied with any and all EPA and State requests for information regarding the Site pursuant to Sections 104(e) and 122(e)(3)(B) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e)(3)(B), and Section 3007 of RCRA, 42 U.S.C. § 6927, and state law.

## **XXII. NOTICES AND SUBMISSIONS**

115. Individuals and Addresses. All approvals, consents, deliverables, modifications, notices, notifications, objections, proposals, reports, and requests specified in this CD must be in writing unless otherwise specified. Whenever, under this Consent Decree, notice is required to be given, or a report or other document is required to be sent, by one Party to another, it must be directed to the person(s) specified below at the address(es) specified below. Any Party may change the person and/or address applicable to it by providing notice of such change to all Parties. All notices under this Section are effective upon receipt, unless otherwise specified. Notices required to be sent to EPA, and not to the United States, should not be sent to the DOJ. Except as otherwise provided, notice to a Party by email (if that option is provided below) or by regular mail in accordance with this Section satisfies any notice requirement of the Consent Decree regarding such Party.



As to the United States:

EES Case Management Unit, U.S. Department of Justice  
Environment and Natural Resources Division  
U.S. Department of Justice  
P.O. Box 7611  
Washington, D.C. 20044-7611  
Re: DJ #90-11-2-430

and

Chief, Environmental Defense Section  
U.S. Department of Justice  
Environment and Natural Resources Division  
U.S. Department of Justice  
P.O. Box 7611  
Washington, D.C. 20044-7611  
Re: DJ #90-11-2-430

As to EPA:

Nikia Greene (RPM and Project Coordinator)  
EPA Project Coordinator  
U.S. Environmental Protection Agency  
Region 8 Montana Office  
10 West 15th Street, Suite 3200  
Helena, Montana 59624

D. Henry Elsen, Attorney  
U.S. Environmental Protection Agency  
Region 8 Montana Office  
10 West 15th Street, Suite 3200  
Helena, Montana 59624



As to the Regional Financial Management Officer:

Ben Bielenberg  
U.S. Environmental Protection Agency  
Region 8  
1595 Wynkoop Street  
Denver, CO 80202-1129  
[bielenberg.ben@epa.gov](mailto:bielenberg.ben@epa.gov)

As to EPA Cincinnati Finance Center:

EPA Cincinnati Finance Center  
26 W. Martin Luther King Drive  
Cincinnati, Ohio 45268  
[cinwd\\_acctsreceivable@epa.gov](mailto:cinwd_acctsreceivable@epa.gov)

As to the State or DEQ:

Daryl Reed (State Project Officer and Project Officer)  
BPSOU CERCLA Site  
Department of Environmental Quality  
Remediation Division  
P.O. Box 200901  
Helena, Montana 59620-0901

Jonathan Morgan  
DEQ Legal Counsel  
Montana Department of Environmental Quality  
P.O. Box 200901  
Helena, Montana 59620-0901

Jim Ford, State NRD Project Coordinator  
Montana Natural Resource Damage Program  
Montana Department of Justice  
P.O. Box 201425  
1720 Ninth Avenue  
Helena, Montana 59620-1425

As to AR:

Josh Bryson (Project Coordinator)  
Operations Project Manager  
Atlantic Richfield Company  
317 Anaconda Road  
Butte, Montana 59701



Jean A. Martin, Senior Counsel  
Atlantic Richfield Company  
501 Westlake Park Blvd., Low Rise Room 3.664A  
Houston, Texas 77079

As to BSB:  
Eric Hassler and Julia Crain  
Butte Silver Bow County  
155 West Granite Street  
Butte, Montana 59701

### **XXIII. RETENTION OF JURISDICTION**

116. This Court retains jurisdiction over both the subject matter of this Consent Decree and the Parties for the duration of the performance of the terms and provisions of this Consent Decree for the purpose of enabling any of the Parties to apply to the Court for such further order, direction, and relief as may be necessary or appropriate for the construction or modification of this Consent Decree, or to effectuate or enforce compliance with its terms, or to resolve disputes in accordance with Section XV (Dispute Resolution) hereof.

### **XXIV. APPENDICES**

117. The following appendices are attached to and incorporated into this Consent Decree:

Appendix A – The 2006 BPSOU Record of Decision, the 2011 Explanation of Significant Differences, and the 2020 Record of Decision Amendment  
Appendix B – Figure of the BPSOU Surface Boundary  
Appendix C – Subdrain Figures  
Appendix D – BPSOU SOW  
Appendix E – Institutional Controls Implementation and Assurance Plan for the BPSOU Site  
Appendix F – Figure of Railroad Properties  
Appendix G – Map of Source Areas  
Appendix H – BTC Riparian Actions Outline



## **XXV. EFFECTIVE DATE**

118. The Effective Date of this Consent Decree shall be 60 days from the date that this District Court enters the Consent Decree, unless an appeal of the entry and judgment is filed during the 60-day period; if an appeal is taken, the Effective Date shall mean the date on which the District Court's judgment is affirmed.

## **XXVI. MODIFICATION**

119. Except as provided in Paragraph 27 (Modification of SOW or Related Deliverables), material modifications to this Consent Decree, including the SOW, shall be in writing, signed by the United States and Settling Defendants, and shall be effective upon approval by the Court. Except as provided in Paragraph 27, non-material modifications to this Consent Decree, including the SOW, shall be in writing and shall be effective when signed by duly authorized representatives of the United States and Settling Defendants. All modifications to the Consent Decree, and any material modification of the SOW except as provided in Paragraph 27, shall also be signed by the State, or a duly authorized representative of the State, as appropriate. A modification to the SOW shall be considered material if it: (a) further waives an ARAR; (b) modifies Paragraph 1.3 of the SOW; or (c) implements an ESD that significantly alters the basic features of the selected remedy within the meaning of 40 C.F.R. § 300.435(c)(2)(i), except as provided in Paragraph 27 and Section IX (Remedy Review). Before providing its approval to any modification to the SOW, the United States will provide the State with a reasonable opportunity to review and comment on the proposed modification.

120. Nothing in this Consent Decree shall be deemed to alter the Court's power to enforce, supervise, or approve modifications to this Consent Decree.



## **XXVII. LODGING AND OPPORTUNITY FOR PUBLIC COMMENT**

121. This Consent Decree shall be lodged with the Court for a period of not less than thirty (30) days for public notice and comment in accordance with Section 122(d)(2) of CERCLA, 42 U.S.C. § 9622(d)(2), and 28 C.F.R. § 50.7. The United States and the State reserve their rights to withdraw or withhold their consent if the comments regarding this Consent Decree disclose facts or considerations which indicate that this Consent Decree is inappropriate, improper, or inadequate. The Settling Defendants each consent to the entry of this Consent Decree without further notice.

122. If for any reason the Court should decline to approve this Consent Decree in the form presented, this agreement is voidable at the sole discretion of any Party and the terms of this Consent Decree may not be used as evidence in any litigation between the Parties.

123. Upon entry of this Consent Decree, EPA will terminate unilateral administrative order or administrative order on consent Docket Nos. CERCLA-VIII-88-05, CERCLA-VIII-89-21, CERCLA-VIII-90-11, CERCLA-VIII-90-12, CERCLA-VIII-90-14, CERCLA-VIII-91-13, CERCLA-VIII-92-04, CERCLA-VIII-92-17, CERCLA-VIII-92-18, CERCLA-VIII-92-23, CERCLA-VIII-94-21, CERCLA-VIII-95-58, CERCLA-VIII-2000-02 and CERCLA-08-2011-0011 (except as to obligations pertaining to Group 1 Respondents for Residential Solid Media Remedial Action and all obligations pertaining to the Remedy on Railroad Properties (Group 2 Respondents' obligations)).

## **XXVIII. SIGNATORIES / SERVICE**

124. The undersigned representatives of the Settling Defendants, the Environment and Natural Resources Division of the United States Department of Justice, the United States Environmental Protection Agency, the State of Montana, including the Montana Department of



Environmental Quality, and the State of Montana Natural Resource Damage Program each certifies that he or she is fully authorized to enter into the terms and conditions of this Consent Decree and to execute and legally bind such Party to this document.

125. Each Party hereby agrees not to oppose entry of this Consent Decree by this Court or to challenge any provision of this Consent Decree unless the United States or the State has notified the Settling Defendants in writing that it no longer supports entry of this Consent Decree.

126. The Settling Defendants shall each identify, on the attached signature page, the name, address and telephone number of an agent who is authorized to accept service of process by mail on behalf of that Party with respect to all matters arising under or relating to this Consent Decree. The Settling Defendants each hereby agrees to accept service in that manner and to waive the formal service requirements set forth in Rule 4 of the Federal Rules of Civil Procedure and any applicable local rules of this Court, including, but not limited to, service of a summons. Settling Defendants need not file any response to the United States' Fifth Amended Complaint or the State's Complaint filed in this action, if the State's Motion to Intervene is granted, unless and until 30 days after the Court expressly declines to enter this Consent Decree as a final judgement.

127. Upon the Court's approval of this Consent Decree, the Decree shall be entered as a final judgment under Fed. R. Civ. P. 54(b), and shall serve to satisfy the settlement negotiation requirements contained in paragraph 31(e) of the Streamside Tailings Consent Decree with respect to the BPSOU. The Court expressly determines that there is no just reason for delay in entering this judgment.



SO ORDERED THIS \_\_\_\_ DAY OF \_\_\_\_\_, 2020.


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UNITED STATES DISTRICT COURT JUDGE




THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States, *et al.* v. Atlantic Richfield Company, *et al.*, Civil No. CV-89-39-BU-SEH, subject to the public notice and comment requirements of 28 C.F.R. § 50.7.

FOR THE UNITED STATES OF AMERICA:

  
JONATHAN BRIGHTBILL  
Deputy Assistant Attorney General  
Environment & Natural Resources Division  
U.S. Department of Justice  
Washington, D.C. 20530

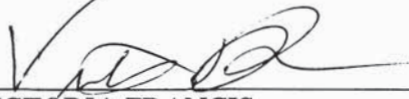
Date: 2/23/2019

  
JAMES D. FREEMAN  
Senior Attorney  
Environmental Enforcement Section  
U.S. Department of Justice  
999 Eighteenth Street  
South Terrace Suite 370  
Denver, CO 80202

Date: 5/12/20

  
KURT G. ALME  
United States Attorney  
District of Montana  
316 N 26th St #5018  
Billings, MT 59101

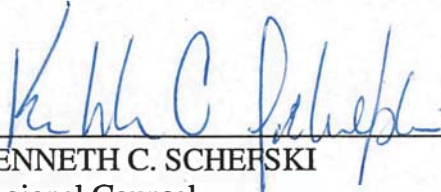
Date: 5-22-20

  
VICTORIA FRANCIS  
Assistant United States Attorney  
District of Montana  
316 N 26th St #5018  
Billings, MT 59101

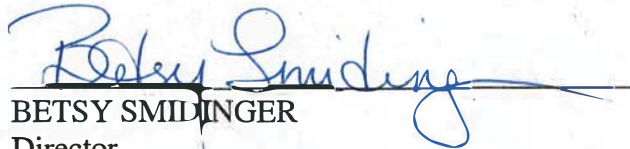
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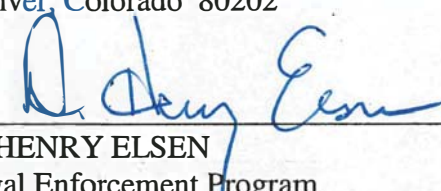
THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States, *et al.* v. Atlantic Richfield Company, *et al.*, Civil No. CV-89-39-BU-SEH, subject to the public notice and comment requirements of 28 C.F.R. § 50.7.

  
KENNETH C. SCHEFSKI  
Regional Counsel  
U.S. Environmental Protection Agency, Region 8  
1595 Wynkoop Street  
Denver, Colorado 80202

Date: 5/21/2020

  
BETSY SMIDINGER  
Director  
Superfund and Emergency Management Division  
U.S. Environmental Protection Agency, Region 8  
1595 Wynkoop Street  
Denver, Colorado 80202

Date: 5/21/2020

  
D. HENRY ELSÉN  
Legal Enforcement Program  
U.S. Environmental Protection Agency  
Region 8 Montana Office  
10 West 15th Street, Suite 3200  
Helena, Montana 59624

Date: 5/21/2020




THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States, *et al.* v. Atlantic Richfield Company, *et al.*, Civil No. CV-89-39-BU-SEH, subject to the public notice and comment requirements of 28 C.F.R. § 50.7 and § 75-10-713, MCA.


FOR THE STATE OF MONTANA:

  
\_\_\_\_\_  
STEVE BULLOCK  
Governor of the State of Montana


Date: June 3, 2020

  
\_\_\_\_\_  
TIM FOX  
Montana Attorney General

Date: 1 June 2020

  
\_\_\_\_\_  
GEORGE MATHIEUS  
Deputy Director  
Montana Department of Environmental Quality

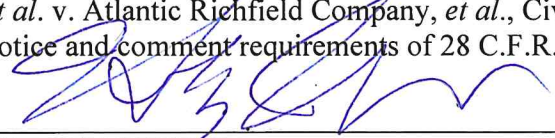
Date: 06/01/2020

  
\_\_\_\_\_  
JONATHAN MORGAN  
Special Assistant Attorney General  
DEQ Legal Counsel  
Montana Department of Environmental Quality  
1100 North Last Chance Gulch  
P.O. Box 200901  
Helena, Montana 59620-0901

Date: 6/1/2020



THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States, *et al. v. Atlantic Richfield Company, et al.*, Civil No. CV-89-39-BU-SEH, subject to the public notice and comment requirements of 28 C.F.R. § 50.7 and § 75-10-713, MCA.



HARLEY HARRIS  
Supervising Assistant Attorney General

Date: June 1, 2020



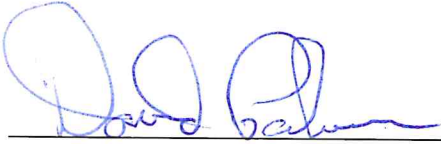
KATHERINE M. HAUSRATH  
Assistant Attorney General  
Montana Natural Resource Damage Program  
Montana Department of Justice  
P.O. Box 201425  
1720 Ninth Avenue  
Helena, Montana 59620-1425

Date: 5/29/2020



THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States, *et al. v. Atlantic Richfield Company, et al.*, Civil No. CV-89-39-BU-SEH.

FOR THE CITY AND COUNTY OF BUTTE-SILVER BOW



Date: 5-22-2020

DAVID PALMER

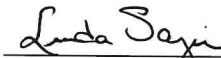
(authorized to accept service of process by mail on behalf of BSB as noted in Paragraph 126)

Chief Executive

Butte-Silver Bow County



ATTEST:



SALLY HOLLISS / OR LINDA SAJOR  
CLERK AND RECORDER /  
DEPUTY CLERK AND RECORDER

APPROVED AS TO FORM:



Date: 5-22-20

EILEEN JOYCE

County Attorney

Butte-Silver Bow County

155 W. Granite

Butte, MT 59701



Date: 5-22-2020

MOLLIE MAFFEI

Deputy County Attorney

Butte-Silver Bow County

155 W. Granite

Butte, MT 59701



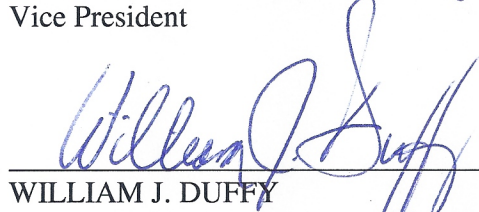
THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of United States, *et al.* v. Atlantic Richfield Company, *et al.*, Civil No. CV-89-39-BU-SEH.

FOR THE ATLANTIC RICHFIELD COMPANY:

  
PATRICIA GALLERY

Vice President

Date: 5-21-2020

  
WILLIAM J. DUFFY

Date: 5-21-2020

(authorized to accept service of process by mail on behalf of AR as noted in Paragraph 126)  
Davis Graham & Stubbs LLP  
1550 17th Street, Suite 500  
Denver, Colorado 80202

  
JEAN A. MARTIN

Date: 5-21-2020

Senior Attorney  
Atlantic Richfield Company  
501 Westlake Park Blvd., Low Rise Room 3.664A  
Houston, Texas 77079



**ROD**  
**for the**  
**BUTTE PRIORITY SOILS OPERABLE UNIT**  
**of the**  
**SILVER BOW CREEK / BUTTE AREA SUPERFUND**  
**SITE**  
**Butte-Silver Bow County, Montana**

**APPENDIX A**  
**TO THE CONSENT DECREE**

- A. The 2020 BPSOU Record of Decision Amendment
- B. The 2011 BPSOU Explanation of Significant Differences
- C. The 2006 BPSOU Record of Decision



**RECORD OF DECISION AMENDMENT**  
**for the**  
**BUTTE PRIORITY SOILS OPERABLE UNIT**  
**of the**  
**SILVER BOW CREEK/BUTTE AREA**  
**SITE**  
**Butte and Walkerville, Montana**



1954



Future

**U.S. Environmental Protection Agency**  
**Montana Department of Environmental Quality**







## **PART 1 – DECLARATION**

### **Site Name and Location**

Silver Bow Creek/Butte Area Site, Butte Priority Soils Operable Unit (BPSOU), OU #08, CERCLIS ID Number: MTD980502777; SSID: 0823. The BPSOU is located in portions of Butte and Walkerville, Montana.

### **Statement of Basis and Purpose of this Amendment**

This document amends the 2006 BPSOU Record of Decision (EPA 2006), as amended by the 2011 BPSOU Explanation of Significant Differences (ESD) (EPA 2011a) (hereinafter, the 2006/2011 BPSOU Record of Decision), for the remedial action to clean up mining-related contamination at the BPSOU. The amended remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act as amended (CERCLA), 42 U.S.C. §§ 9601 *et seq.* and, to the extent practicable, the National Oil and Hazardous Substance Pollution Contingency Plan (NCP), 40 CFR Section 300.

This document is issued by United States Environmental Protection Agency (EPA), the lead agency, with the concurrence of Montana Department of Environmental Quality (DEQ), the supporting agency.

The selected remedy is based on the administrative record for the 2020 BPSOU Record of Decision Amendment and will become part of that administrative record per the NCP, Section 300.825(a)(2). The administrative record and copies of key documents are available for public review at Montana Tech Library at 1300 West Park Street, Butte, Montana 59701. The administrative record is also maintained at the EPA-Montana Office, 10 West 15th Street, Suite 3200, in Helena, Montana and can be viewed during normal business hours.

### **Assessment of the BPSOU**

The BPSOU is located in portions of Butte and Walkerville in southwestern Montana. Mining, milling and smelting activities conducted for nearly 100 years resulted in the contamination of soils, surface water, and groundwater, primarily through disposal practices from milling and smelting operations, as well as smelter emissions. The primary contaminants of concern are arsenic, cadmium, copper, lead, mercury and zinc. As stated in the 2006 BPSOU Record of Decision and documented in the administrative record, there are many pathways at the BPSOU site that create unacceptable risks to human health and the environment. The remedial action selected in the 2006 BPSOU Record of Decision as amended in the 2011 BPSOU ESD and the further amended response actions described in this 2020 Record of Decision Amendment are necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment at the BPSOU.

### **Description of the Record of Decision Amendment**

The 2020 BPSOU Record of Decision Amendment addresses a fundamental change to the original 2006 BPSOU Record of Decision and the 2011 BPSOU ESD. It waives certain State of Montana in-stream surface water quality standards to corresponding protective federal standards (Section



4). These waivers of in-stream surface water quality standards apply to the acute copper and zinc in-stream water quality standards upon the effective date of this record of decision amendment. Other waivers of in-stream standards, identified more specifically below, will become effective only after remedial action is implemented and extensive in-stream monitoring is conducted, and will be triggered only if necessary. These waivers are based on a finding that compliance with such requirements is technically impracticable from an engineering perspective, pursuant to section 121(d)(4)(C) of CERCLA, 42 U.S.C. Section 9622(d)(4)(C) and 40 CFR Section 300.430(f)(1)(ii)(C)(3). These standards are replaced by federal water quality criteria, which are protective of aquatic life when no contaminated sediments are present. The 2020 Record of Decision Amendment also includes six significant changes (Section 5) that expand upon components of the original remedy. Finally, it includes 13 minor modifications (Appendix A) for the purpose of documenting them in the administrative record. Taken together, the combined changes reflect a fundamental change to the previously selected remedy, and are documented in this record of decision amendment, in accordance with the NCP.

### **Statutory Determinations**

The selected remedy, as amended, meets the mandates of CERCLA § 121 and the NCP. It is protective of human health and the environment, complies with all federal and state requirements that are applicable or relevant and appropriate to the remedial action or appropriately waives these requirements, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

The remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. Active treatment of mining waste would be significantly more expensive due to the large quantities of materials impacted. Although they are present in large volumes, the solid materials within the BPSOU are generally low in toxicity and can be reliably removed or contained without treatment.

Because the selected remedy, as amended, will continue to result in mining waste contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, statutory 5-year reviews have been initiated at the BPSOU and will continue to ensure that remedies remain protective of human health and the environment. The 5-year reviews will continue to focus on areas where waste has been left in place or where remaining concentrations of site-related contamination do not allow for unlimited use of the property.



**Authorizing Signatures**

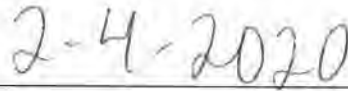
This 2020 BPSOU Record of Decision Amendment, along with unaltered portions of the 2006/2011 BPSOU Record of Decision, documents the selected remedy for OU #8, the Butte Priority Soils Operable Unit of the Silver Bow Creek/Butte Area National Priorities List Site. This remedy was selected by EPA with the concurrence of the State of Montana, as authorized by the EPA signatory below and the DEQ letter of concurrence.

A handwritten signature in black ink, appearing to read "Andrew R. Wheeler", written over a horizontal line.

Andrew R. Wheeler

Administrator

United States Environmental Protection Agency

A handwritten date "2-4-2020" in black ink, written over a horizontal line.

Date









February 4, 2020

Gregory Sopkin, Regional Administrator  
US Environmental Protection Agency  
Region 8  
1595 Wynkoop Street  
Denver, CO 80202-8917

**RE: State Concurrence February 2020 Amendment to the Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site.**

Dear Mr. Sopkin,

The Montana Department of Environmental Quality (DEQ) concurs with the 2020 Record of Decision Amendment for the Butte Priority Soils Operable Unit (BPSOU), Silver Bow Creek/Butte Area NPL Site in Montana, on the following conditions: (1) the proposed 2020 Consent Decree is entered for BPSOU; and (2) the expanded Residential Metals Abatement Program (RMAP) is implemented through a Unilateral Administrative Order. The expanded components of the original remedy—as originally outlined in the 2006 ROD and as amended in this 2020 ROD Amendment—will lead to improvements in the surface water quality within BPSOU, and provide greater protections to human health via the expanded RMAP. DEQ appreciates the Environmental Protection Agency's (EPA's) willingness to consider our input as to the protectiveness of the overall remedy, as well as our comments and suggestions as to the scope of the expansion of the original remedy. DEQ offers our continued support as we move to the remedial design and implementation of these remedial action elements, as well as the long-term operations and maintenance of this remedy to protect human health and the environment.

The State of Montana has spent significant resources investigating the sources of contamination in BPSOU. The State's implementation of the Parrot Tailings Waste Removal Project, using natural resource damage restoration authority, addresses the State's long-standing concerns with the primary source area of mine waste contamination to the alluvial groundwater system. This source removal effort, combined with remedy requirements to capture and treat contaminated groundwater that is discharging to and adversely impacting Blacktail Creek or Silver Bow Creek surface water at the compliance points or to instream sediments anywhere in BPSOU as outlined in the proposed 2020 Consent Decree for BPSOU and attachments, ensures that the creeks will be protected.

This ROD Amendment does allow for the waiver of existing surface water quality standards from the State standards in DEQ-7 to the federal water quality standards. Specifically, the ROD Amendment establishes an upfront waiver of DEQ-7 standards for copper and zinc during acute, wet-weather events. The ROD Amendment also provides for contingent waivers of aluminum, arsenic, cadmium, copper, lead, mercury, silver, and zinc during acute, wet-weather conditions and chronic, normal flow conditions only if non-compliance with the DEQ-7 standards is demonstrated after construction of the technically practicable remedial elements. DEQ concurs with such waivers based on the technical impracticability of meeting the State standards for all contaminants during all flow conditions, provided the proposed 2020 Consent Decree for BPSOU is entered.



DEQ's concurrence is predicated on the full implementation of the expanded components of the original remedy as outlined in this ROD Amendment, and the work commitments outlined in the proposed 2020 Consent Decree for BPSOU. These expanded components, include, but are not limited to:

- removal of additional wastes in the Diggings East Stormwater Basin Area and the Northside Tailings/East Buffalo Gulch Area, and the removal of contaminated sediments, streambanks and floodplains of Blacktail Creek and the Butte Reduction Works Smelter Area;
- construction of basins to treat, through passive settling of sediments, the stormwater at Diggings East, Buffalo Gulch, Grove Gulch, and Northside Tailings/East Buffalo Gulch; and
- capture of contaminated groundwater that discharges to Blacktail Creek or Silver Bow Creek that causes an exceedance of a surface water standard at a surface water compliance points or an instream sediment performance criterion anywhere within the BPSOU, as outlined in the Surface Water Management Plan attached to the Consent Decree.

This plan provides, in part, the methodology for evaluating the effectiveness of the additional contaminated groundwater capture agreed to and requires additional sediment removals if the contaminated groundwater is unacceptably impacting sediments. These actions will help ensure the continued protectiveness of Blacktail and Silver Bow Creeks. These actions represent the technically practicable elements that can be implemented within BPSOU to address contamination of historic mine wastes that impact surface water and sediment quality within the BPSOU.

In addition to the expanded components of the original surface water remedy, this ROD Amendment also provides an important expansion of the RMAP program. This program is essential to the protectiveness of the remedy, as it directly addresses where citizens live - their homes. Expanding the boundary of this program to address rural residential properties (outside of the BPSOU boundaries) is an important step in ensuring the long-term protectiveness of the remedy for those potentially impacted by contamination from historic mine waste. DEQ's support for the current soil cleanup levels is contingent upon continued implementation of the RMAP under a Unilateral Administrative Order or future consent decree.

Sincerely,



George Mathieus  
Deputy Director  
Montana Department of Environmental Quality



## Part 2 – Decision Summary

### TABLE OF CONTENTS

<b>LIST OF FIGURES .....</b>	<b>ii</b>
<b>LIST OF TABLES .....</b>	<b>iii</b>
<b>LIST OF APPENDICES .....</b>	<b>iii</b>
<b>LIST OF ACRONYMS .....</b>	<b>iv</b>
<b>1.0 INTRODUCTION AND STATEMENT OF PURPOSE .....</b>	<b>1</b>
1.1 Site Name and Location.....	1
1.2 Purpose for the Amendment .....	1
1.3 Administrative Record .....	2
1.4 Terms Important to Understanding the Record of Decision Amendment .....	4
<b>2.0 HISTORY, CONTAMINATION, AND THE 2006/2011 REMEDY .....</b>	<b>5</b>
2.1 Site Description.....	6
2.2 Nature and Extent of Contamination .....	6
2.3 Previous Cleanup Activities.....	9
2.4 Activities Conducted since the 2006 BPSOU Record of Decision.....	9
2.5 Surface Water Remedial Action Objectives and Overall Remedial Goals.....	11
2.6 Summary of the Original Remedy for Surface Water .....	11
<b>3.0 BASIS FOR REVISIONS TO THE 2006/2011 REMEDY .....</b>	<b>12</b>
3.1 Fundamental Change to the Original 2006/2011 Remedy.....	13
3.2 Significant Changes to the Original 2006/2011 Remedy .....	15
<b>4.0 DESCRIPTION OF THE FUNDAMENTAL CHANGE TO THE REMEDY ...</b>	<b>16</b>
4.1 The Remedy Established in the 2006/2011 Record of Decision Remedy .....	16
4.2 The 2020 Selected Remedy in the 2020 Record of Decision Amendment.....	17
4.2.1 Modification of Performance Standards.....	17
4.2.2 Modification of Surface Water RAOs.....	21
<b>5.0 DESCRIPTION OF SIGNIFICANT CHANGES .....</b>	<b>22</b>
5.1 Expand Mine Waste Removal in Silver Bow Creek and Blacktail Creek Areas22	
5.1.1 2006/2011 Remedy Component – Waste Removal from Blacktail and Silver Bow Creek Channels .....	22
5.1.2 2020 Selected Remedy .....	23
5.2 Expand Contaminated Groundwater Control and Capture System West and South of BPSOU Subdrain.....	27
5.2.1 2006/2011 Remedy Component – Surface Water Management for Base Flow Remediation.....	27
5.2.2 2020 Selected Remedy .....	27
5.3 Remove Mine Waste to Construct Storm Water Controls.....	28
5.3.1 2006/2011 Remedy Component – Iterative BMP Program for Storm Water Remediation .....	28
5.3.2 2020 Selected Remedy .....	28



5.4	Clarify Flow Augmentation Contingency.....	29
5.4.1	2006/2011 Remedy Component – In-Stream Flow Augmentation Contingency .....	29
5.4.2	2020 Selected Remedy .....	29
5.5	Clarify Storm Water Treatment Contingency.....	31
5.5.1	2006/2011 Remedy Component – Storm Water Treatment Contingency .....	31
5.5.2	2020 Selected Remedy .....	31
5.6	Remove Requirement for Infiltration Barriers on the Parrot Tailings, Diggings East and Northside Tailings Mine Waste Areas .....	31
5.6.1	2006/2011 Remedy Component – Evaluation and Implementation of Infiltration Barriers .....	31
5.6.2	2020 Selected Remedy .....	31
<b>6.0</b>	<b>EVALUATION OF MODIFICATION .....</b>	<b>32</b>
6.1	Threshold Criteria .....	32
6.1.1	Overall Protection of Human Health and the Environment .....	32
6.1.2	Compliance with ARARs .....	33
6.2	Primary Balancing Criteria .....	34
6.2.1	Long-term Effectiveness and Permanence .....	34
6.2.2	Reduction of Toxicity, Mobility, or Volume .....	35
6.2.3	Short-term Effectiveness .....	36
6.2.4	Implementability .....	36
6.2.5	Cost.....	37
6.3	Modifying Criteria .....	37
6.3.1	State Acceptance .....	37
6.3.2	Community Acceptance .....	38
<b>7.0</b>	<b>STATUTORY DETERMINATIONS.....</b>	<b>38</b>
<b>8.0</b>	<b>PUBLIC PARTICIPATION .....</b>	<b>39</b>
<b>9.0</b>	<b>REFERENCES .....</b>	<b>40</b>

## LIST OF FIGURES

Figure 1	Silver Bow Creek/Butte Area Site Operable Units
Figure 2	BPSOU Surface Boundary
Figure 3	Timeline of Response Actions and Remedial Activities Leading to the 2006 BPSOU Record of Decision
Figure 4	Locations of Surface Water Remedy Components
Figure 5	Mine Waste Repository Locations and Potential Haul Routes



## **LIST OF TABLES**

Table 1	In-Stream Chronic Surface Water Performance Standards and Proposed Waived-to Chronic Performance Standards (Base Flow and Normal High Flow Conditions)
Table 2	In-Stream Acute Surface Water Performance Standards and Proposed Waived-to Acute Performance Standards (Wet Weather Conditions)
Table 3	Significant Changes to the Original Remedy

## **LIST OF APPENDICES**

Appendix A	Minor Modifications to the Original Remedy
Appendix B	Responsiveness Summary



## LIST OF ACRONYMS

µg/l	micrograms per liter
agencies	EPA and DEQ
ARAR	applicable or relevant and appropriate requirement
BLM	Biotic Ligand Model
BMP	best management practice
BPSOU	Butte Priority Soils Operable Unit
BPSOU ROD	The 2006 BPSOU Record of Decision as amended by the 2011 Explanation of Significant Differences and the 2020 BPSOU Record of Decision Amendment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act, as amended
CFR	Code of Federal Regulations
COC	contaminant of concern
DEQ	Montana Department of Environmental Quality
Circular DEQ-7	State of Montana's water quality standards
EPA	U.S. Environmental Protection Agency
ESD	explanation of significant differences
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
RAO	remedial action objective
RMAP	Residential Metals Abatement Program
SWCDP	BPSOU Surface Water Compliance Determination Plan
SWMP	BPSOU Surface Water Management Plan
TCRAs	time-critical response actions
TI	technical impracticability
U.S.C.	United States Code



## **1.0 INTRODUCTION AND STATEMENT OF PURPOSE**

### **1.1 Site Name and Location**

Site Name:	Silver Bow Creek/Butte Area Site
CERCLIS ID Number:	MTD980502777
Operable Unit:	Butte Priority Soils Operable Unit (BPSOU), 08
Original Record of Decision:	September 21, 2006 (U.S. Environmental Protection Agency [EPA] 2006)
Explanation of Significant Differences (ESD):	July 18, 2011 (EPA 2011a)

### **1.2 Purpose for the Amendment**

Since the 2006 BPSOU Record of Decision (EPA 2006) and 2011 BPSOU ESD (EPA 2011a), hereinafter referred to as the 2006/2011 BPSOU Record of Decision, were issued, the responsible parties have implemented significant portions of the BPSOU remedy, but more necessary work remains. The EPA, the Montana Department of Environmental Quality (DEQ) and the current responsible parties have been analyzing remaining technical issues and evaluations, primarily focused on the current remedy's surface water component, while other remedial work continues.

Additional detailed studies have been conducted to help finalize remaining components of the remedy. Most have centered around how to achieve in-stream water quality standards and best protect surface water quality in Blacktail Creek and Silver Bow Creek below the confluence with Blacktail Creek, given the physical constraints of the BPSOU. As a result, more extensive and more detailed remediation is required beyond what was originally specified in the 2006 BPSOU Record of Decision.

Even with this additional remediation, surface water data and modeling evaluations indicate there is uncertainty as to whether all of the 2006/2011 BPSOU Record of Decision remedial goals and the State of Montana's in-stream water quality standards, referred to as Circular DEQ-7 standards (DEQ 2017), for surface water could be met. This uncertainty resulted in EPA conducting a surface water technical impracticability (TI) evaluation, in consultation with DEQ, to determine the likelihood of meeting remedial goals and applicable or relevant and appropriate requirement (ARAR) standards for in-stream surface water. A variety of surface water and storm water remedial components were evaluated quantitatively in the TI evaluation.

Under CERCLA, ARAR standards that initially apply to cleanup can be waived and, if necessary, replaced by other protective standards, where appropriate, if it is technically impracticable from an engineering perspective to meet the initial



standards. *See*, section 121(e) of CERCLA, 42 U.S.C. Section 9621(e) and 40 C.F.R. Section 300.430(f)(ii)(C)(3). Based on the 2018 TI evaluation results, EPA, in consultation with DEQ, chose to modify the remedy established in the 2006/2011 BPSOU Record of Decision to waive certain Circular DEQ-7 standards for specific contaminants of concern (COCs) and under specific flow regimes, necessitating this record of decision amendment.

This record of decision amendment presents a brief overview of the BPSOU and prior enforcement activities for implementation of BPSOU response actions. It also includes the basis for the amendment and its specific components based on new information, evaluation of alternatives, description of the selected remedy, and statutory determinations. This amendment does not change components of the 2006/2011 BPSOU Record of Decision except as specifically described herein. The 2006/2011 BPSOU Record of Decision remedial components which are not removed or modified in this document remain in effect.

The EPA is the lead agency and DEQ is the support agency. The EPA is issuing this record of decision amendment as part of its responsibilities under of Section 117 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) as amended, and the National Contingency Plan (NCP) at Section 300.435 (c)(2)(ii).

For consistency with the consent decree, use of the acronym BPSOU ROD will refer to the end product of the amendment process—the 2006 BPSOU Record of Decision as amended by the 2011 Explanation of Significant Differences and the 2020 BPSOU Record of Decision Amendment. In all other instances, EPA will refer to either the 2006/2011 BPSOU Record of Decision or the 2020 BPSOU Record of Decision Amendment.

### **1.3 Administrative Record**

This record of decision amendment is part of the administrative record for the BPSOU, along with significant documents prepared since the 2011 BPSOU ESD (EPA 2011a) that contributed to the modification of the original surface water remedy. The complete administrative record for the 2020 BPSOU Record of Decision Amendment is housed at Montana Tech Library, 1300 West Park Street, Butte, Montana 59701. The library is open to the public Monday through Friday from 8:30 a.m. to 4:30 p.m. The telephone number is (406) 496-4281. The administrative record is also maintained at the EPA-Montana Office, 10 West 15th Street, Suite 3200, in Helena, Montana and can be viewed during normal business hours.



The following key documents are among the documents available in the administrative record, and their contents support the need for this amendment and the conclusions presented herein:

- *Record of Decision. Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site* (EPA 2006)
- *Explanation of Significant Differences to the 2006 Butte Priority Soils Operable Unit Record of Decision. Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site* (EPA 2011a)
- *Unilateral Administrative Order for Partial Remedial Design, Remedial Action and Certain Operation and Maintenance Activities for the Butte Priority Soils Operable Unit. Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site* (EPA 2011b)
- *2011-2013 Ground Water Data Analysis Report. Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site* (EPA 2015)
- *2008 to 2013 Surface Water Characterization Report. Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site*, (EPA and DEQ 2017)
- *Surface Water Technical Impracticability Evaluation Report. Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site*. (EPA 2019a)
- *Groundwater and Surface Water Interaction Report. Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site*, (EPA 2018)
- *Proposed Plan to Amend the 2006/2011 Record of Decision, Butte Priority Soils Operable Unit*, (EPA 2019b)
- *Further Remedial Elements Scope of Work, Butte Priority Soils Operable Unit of the Silver Bow Creek / Butte Area Superfund Site*, (EPA 2019c)
- *BPSOU Surface Water Management Plan or SWMP, Butte Priority Soils Operable Unit of the Silver Bow Creek / Butte Area Superfund Site*, (EPA 2019d)
- *BPSOU Surface Water Compliance Determination Plan or SWCDP, Butte Priority Soils Operable Unit of the Silver Bow Creek / Butte Area Superfund Site*, (EPA 2019e)
- *2019 Status For the 2011 Unilateral Administrative Order Work Plan for BPSOU Partial Remedial Design/Remedial Action Implementation, Butte Priority Soils Operable Unit of the Silver Bow Creek / Butte Area Superfund Site*, (EPA 2019f)



- *Ongoing Remedial Elements Scope of Work, Butte Priority Soils Operable Unit of the Silver Bow Creek / Butte Area Superfund Site*, (EPA 2019g)
- *Description of the Wet Weather Remedial Element, Butte Priority Soils Operable Unit of the Silver Bow Creek / Butte Area Superfund Site*, (EPA 2019h)

#### 1.4 Terms Important to Understanding the Record of Decision Amendment

Certain terms are useful for understanding the changes made to the 2006/2011 BPSOU Record of Decision in this record of decision amendment. Terms described below for exposure and metals analysis are used in a manner that is consistent with Superfund activities throughout the nation. Terms described below for flow regime are specific to the BPSOU. They are defined here to avoid confusion due to differences between usage within the BPSOU site record and the usage in EPA guidance.

##### Exposure

- **Acute exposure.** Instantaneous *or* short term. Applies to infrequent wet weather flows in the creek (1-hour average), usually an event like a summer thunderstorm.
- **Chronic exposure.** Long term. *Applies* to base flow or normal high flow in the creek (average conditions over 4 days).

##### Analysis and Standards

- **Dissolved metals analysis.** Analysis of water after it has been filtered (typically a 0.45-micron filter). The filtered (dissolved) concentration is always less than or equal to the unfiltered (total) concentration described below. Most federal water quality criteria are based on dissolved metals analysis because, in EPA's view, a dissolved metal is more bioavailable to aquatic life. Dissolved metals analysis-based standards are considered protective of surface water when there are no contaminated sediments present in a surface water body.
- **Total recoverable metals (or total metals).** Analysis of an unfiltered water sample, including any solid undissolved sediments, visible or microscopic. For metals that are the subject of this ARARs waiver, Montana bases its numeric standards on the federal water quality criteria but applies them to a total recoverable sample instead of a filtered sample, thus making the Montana standards slightly more conservative than the federal criteria. The State of Montana applies total recoverable metals analysis analytical results to surface water standards to incorporate the additional risk to aquatic environments in water bodies that also have contaminated sediments that currently do not have state or federal sediment protectiveness standards. There are also minor



correction factors and other nuanced differences between the state and federal standards.

### **Flow Regime**

- **Base flow.** Base flow is defined as times when groundwater inflow comprises the greatest percentage of flow within surface water. Both surface water flow and groundwater discharge to surface water vary seasonally, but base flow generally occurs in late summer and winter when surface water conditions are fairly stable (i.e., not rising or falling and stormwater or snowmelt runoff is not occurring). For compliance evaluations, chronic aquatic life and human health water quality standards apply to base flow conditions.
- **Normal high flow.** Normal high flow is defined as normal flow that increases above base flow when the regional winter mountain snowpack melts and there is no local wet weather event. In general, the highest concentrations of contaminants are associated with normal high flows and wet weather event flows. As with base flow conditions, for compliance evaluations, COC concentrations at normal high flow are compared to chronic aquatic life and human health performance standards.
- **Wet weather flow.** For the BPSOU, wet weather flow is defined as short duration periods when runoff is occurring from Butte Hill as measured at storm drain outfalls and/or when samples are collected at any of the wet weather discharge points. In general, wet weather flow conditions are highly variable and typically occur during rainfall and snowmelt events from spring through late summer and early fall. For compliance evaluations, COC concentrations in samples collected during wet weather flow conditions are compared to acute aquatic life performance standards. This definition is further clarified in remedial design documents such as the BPSOU Compliance Determination Plan, Section 2.1.1.

## **2.0 HISTORY, CONTAMINATION, AND THE 2006/2011 REMEDY**

Per EPA record of decision guidance (EPA 1999), the introductory sections of a typical record of decision are addressed only briefly in a record of decision amendment. A more detailed summary of previous BPSOU investigations and site conditions is presented in the 2006 BPSOU Record of Decision. Detailed descriptions of the unacceptable site risks found at BPSOU are contained in Section 7 of the 2006 BPSOU Record of Decision. The following focuses on site background relevant to the surface water remedy (including additional groundwater controls to support the surface water remedy) modified by this record of decision amendment.



## **2.1 Site Description**

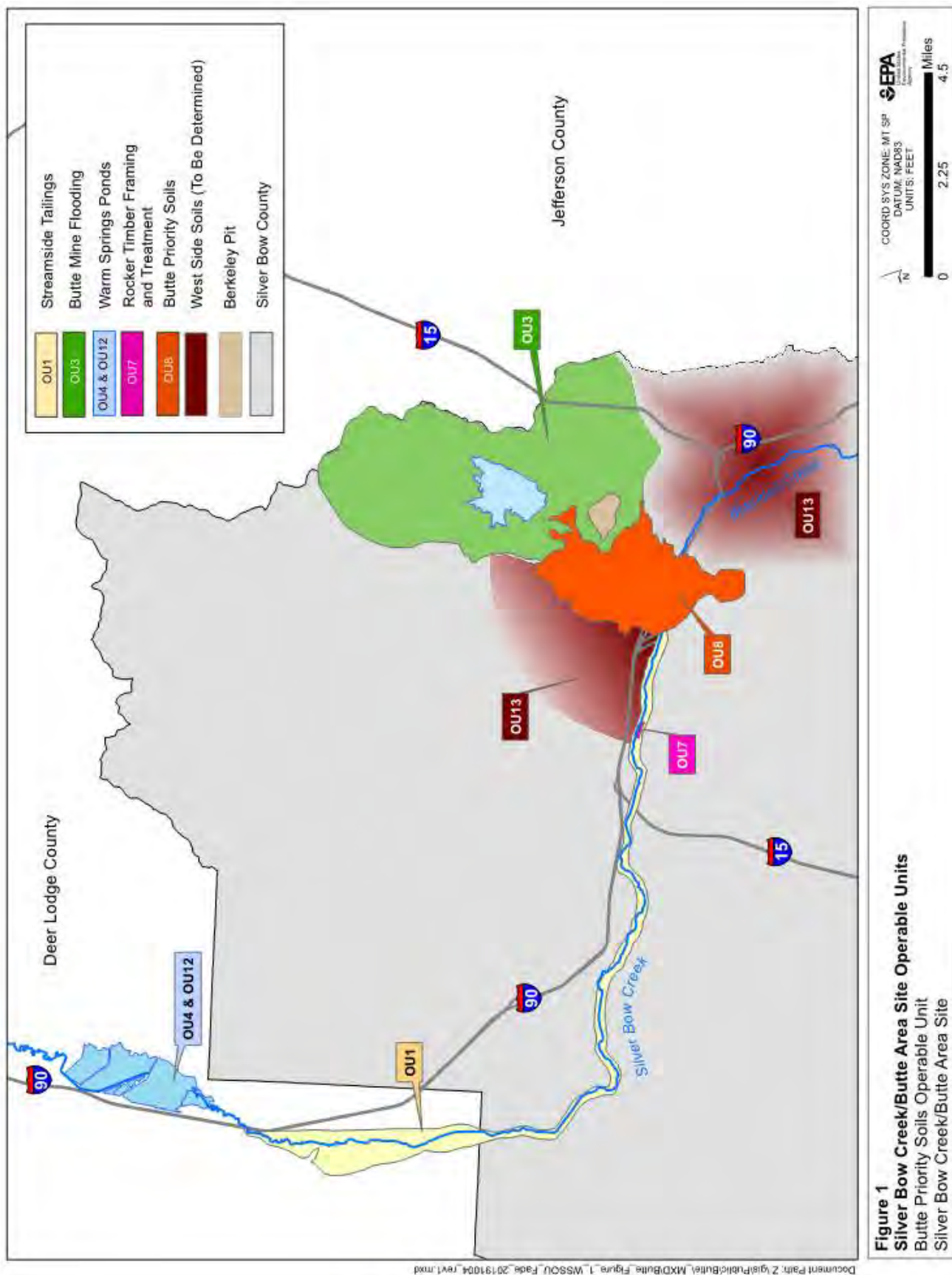
The Silver Bow Creek/Butte Area Site represents one of four contiguous Superfund sites on EPA's National Priorities List (NPL) in the upper Clark Fork River Basin (Figure 1). The other Clark Fork Basin Superfund Sites are the Anaconda Smelter Site, the Clark Fork River/Milltown Reservoir Site and the Montana Pole Site. The four sites extend 140 miles from the area north of Butte to the Milltown Reservoir near Missoula, Montana. The BPSOU lies within the Butte portion of the Silver Bow Creek/Butte Area site, encompassing the Town of Walkerville, the part of Butte north of Silver Bow Creek and west of the Berkeley Pit, and a section of land that extends south from Silver Bow Creek to Timber Butte (Figure 2). The surface boundary for BPSOU is modified by this record of decision amendment from the 2006 BPSOU Record of Decision boundary definition and is shown in Figure 2.

## **2.2 Nature and Extent of Contamination**

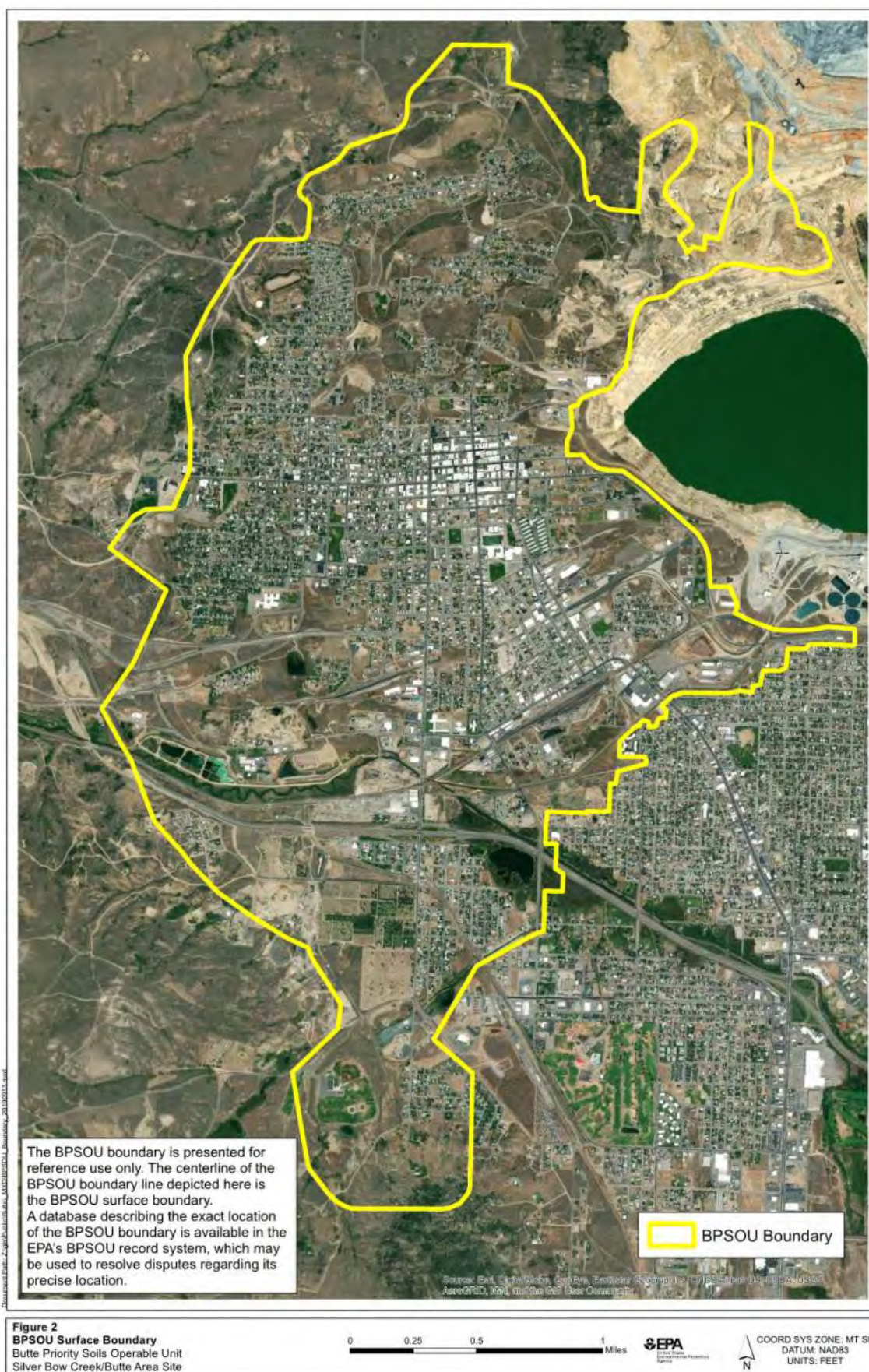
The BPSOU is centered on Butte Hill, which is the location of the historic Butte Mining District. Extensive underground mining, milling, smelting and mineral processing resulted in widespread distribution of mine waste such as waste rock, mill tailings, smelter emissions and slag. These wastes have interacted with water, resulting in impacted soil, groundwater, and surface water at a number of locations throughout BPSOU. Sources include mine waste piles, tailings deposits, smelter emissions, and contaminated railroad beds. Arsenic and metals contained in, or released from, these wastes to soil, surface water, and groundwater pose significant risks to human and ecological receptors if left uncontrolled. COCs for surface water are arsenic and metals (aluminum, cadmium, copper, iron, lead, mercury, silver, and zinc).

EPA began work at the BPSOU in 1987, starting with strategic removals—time critical response actions (TCRAs) and expedited response actions (ERAs)—to address areas of greatest risk first. Remedial investigation and feasibility study investigations began in the 1990s and were completed in 2005. A record of decision was issued in 2006 and an ESD was signed in 2011. Remedial design and construction began in 2006 and continue to the present, including collection and evaluation of significant amounts of data.











Data collected since 2006 has demonstrated that there are remaining uncontrolled sources of contamination that have the potential to contribute to surface water contamination within the BPSOU (see Section 3.0). These known sources vary, depending on flow regime, and include two distinct conditions:

- **Base flow and normal high flow conditions:** Sources for these conditions include mine waste (waste rock and tailings) via contaminated groundwater discharge where it is not captured by the existing groundwater capture system; COC-laden sediment deposits along the bed, banks, and *adjacent* floodplain; and upstream sources outside of the BPSOU.
- **Wet weather flow conditions:** Sources for these conditions include mine waste via runoff and contaminated *groundwater* discharge and upstream sources outside of the BPSOU.

Based on the analysis of additional surface water, sediments, sediment pore water, groundwater and near-stream solid media, it was found that the 2006/2011 BPSOU Record of Decision remedy did not address certain source areas that are impacting surface water (EPA 2015; EPA and DEQ 2017; and EPA 2018a). These findings support the expanded waste removals, additional contaminated groundwater capture, additional stormwater controls and related remedial actions included in this amendment.

### 2.3 Previous Cleanup Activities

Butte was added to the original Silver Bow Creek site in 1987, and numerous removal and remedial actions have occurred to address site contamination. Many large mine waste removal actions and storm water control actions were undertaken prior to issuing the 2006 BPSOU Record of Decision and are listed and described in that document. A timeline of activities leading to the 2006 BPSOU Record of Decision is provided in Figure 3.

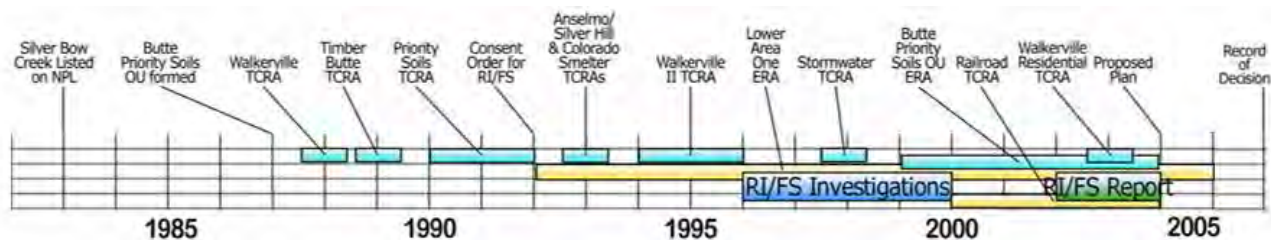


Figure 3. Timeline of Response Actions and Remedial Activities Leading to the 2006 BPSOU Record of Decision

### 2.4 Activities Conducted since the 2006 BPSOU Record of Decision

Since 2006, many remedial activities have been completed or are ongoing, including:

- Extensive residential metals abatement



- Installation of extensive storm water best management practices (BMPs) and other storm water source control measures
- Improvements to and ongoing operation of groundwater treatment at the Butte Treatment Lagoons
- Extension of the groundwater collection system
- Ongoing collection and treatment of groundwater
- Monitoring of surface water and groundwater
- Remediation of additional source areas
- Maintenance of reclaimed mine waste areas
- Operation of a mine waste repository
- Syndicate and Alice Open Mine Pit remediation
- Significant additional investigations
- A number of smaller remedial activities

This work was done under a CERCLA § 106 unilateral administrative order issued by EPA in 2011 (EPA 2011b) and predecessor orders. That order left the full implementation of the surface water component of the remedy open, pending further evaluation of site conditions and additional analysis.

Long-term surface water monitoring conducted at the downstream end of the site by USGS (Station 12323250) has shown that the total recoverable copper concentrations decreased from approximately 200 µg/L in 1993 to approximately 11 µg/L in 2013 during normal flow conditions and remains at that level today. The chronic performance standard for copper in surface water was exceeded 100% of the time until 2005 when contaminated groundwater collections systems were implemented. Currently, State of Montana surface water quality criteria are met for all COCs during normal flow conditions, with the exception of copper and zinc (which, as noted above, are now met most of the time). Storm water monitoring at the site shows that the magnitude of exceedance of acute performance standards has decreased significantly, but work remains to achieve acute performance standard compliance.

Fish were once considered to be extirpated from Silver Bow Creek. Fish populations were suppressed by COCs in surface water and excessive nutrients from the Metro wastewater treatment plant discharge. As remedial work progressed, fish surveys were conducted, but the population was too low prior to



2015 to obtain reliable population estimates. Monitoring since 2015 has identified populations of sculpin, suckers, brook trout, westslope cutthroat trout, and dace in Silver Bow Creek within Lower Area One, the only station within BPSOU with data. Key to the population improvements have been upgrades to the wastewater treatment plant which became fully operational in 2016, ongoing remedial actions within BPSOU, and the remedial actions within the downstream Streamside Tailings Operable Unit.

## **2.5 Surface Water Remedial Action Objectives and Overall Remedial Goals**

Remedial action objectives (RAOs) presented in the 2006 BPSOU Record of Decision for contaminated surface water remain unchanged for the record of decision amendment, except for the need to waive certain Circular DEQ-7 standards (DEQ 2017), which will be replaced by federal water quality criteria.

The RAOs are:

- Prevent ingestion or direct contact with contaminated surface water that would result in an unacceptable risk to human health.
- Return surface water to a quality that supports its beneficial uses.
- Prevent source areas from releasing contaminants to surface water that would cause the receiving water to violate surface water ARARs and remedial goals for the BPSOU and prevent degradation of downstream surface water sources, including during storm events. This RAO is modified to recognize the ARAR waivers and replacement standards described in Section 4.
- Ensure that point source discharges from any water treatment facility (e.g., water treatment plant, wetland) meet ARARs.
- Prevent further degradation of surface water.
- Meet the more restrictive of chronic aquatic life or human health standards for surface water identified in Circular DEQ-7 through the application of B-1 class standards. This RAO is modified to recognize the ARAR waivers and replacement standards in Section 4.

## **2.6 Summary of the Original Remedy for Surface Water**

There are a number of in-stream ARARs related to surface water and storm water control for the BPSOU. A main remedial goal in the 2006/2011 BPSOU Record of Decision is that water quality in surface water complies with Circular DEQ-7, and a main remedial action objective is for sources of contaminants to surface water (via solid media, contaminated groundwater discharge, or wet weather runoff) to be controlled. The overall remedial goal for Blacktail Creek and Silver Bow Creek downstream of its confluence with Blacktail Creek in the 2006/2011 BPSOU



Record of Decision is to maintain the in-stream concentration of site-specific COCs (aluminum, arsenic, cadmium, copper, iron, lead, mercury, silver, and zinc) below the numeric surface water quality standards identified in Circular DEQ-7 for all flow conditions throughout the length of Blacktail Creek, Grove Gulch Creek, and Silver Bow Creek within and directly downstream of the BPSOU. The Circular DEQ-7 standards, with the exception of aluminum, are all based on the comparison to total recoverable sample analytical results.

Circular DEQ-7 standards are as stringent as, or more stringent than, the corresponding federal water quality criteria enacted by EPA. When determining compliance with the performance standards, the most stringent of the human health or aquatic water quality criterion is applied. The 2006/2011 BPSOU Record of Decision stated that COC concentrations must meet human health standards and not allow zones of acute aquatic life toxicity (i.e., mixing zones) or allow the aquatic life chronic 4-day average and the acute 1-hour (instantaneous) concentrations to exceed the Circular DEQ-7 aquatic life criteria.

### **3.0 BASIS FOR REVISIONS TO THE 2006/2011 REMEDY**

Since the 2006 BPSOU Record of Decision was issued, the responsible parties have implemented significant portions of the remedy, but more work remains. The responsible parties, EPA, and DEQ have analyzed remaining technical issues and evaluations pertaining to components of the surface water remedy and their implementation.

As listed in Section 2.4, additional detailed studies were conducted between 2011 and 2018 to help finalize conceptual aspects for the remedy. The documents resulting from these studies are part of the Administrative Record (Section 1.3) and include:

- *2011-2013 Ground Water Data Analysis Report. Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site*
- *2008 to 2013 Surface Water Characterization Report. Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site*
- *2019 Surface Water Technical Impracticability Evaluation Report. Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site*
- *2018 Groundwater and Surface Water Interaction Report. Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site*
- *2018 and 2019 Remedial Elements Scope of Work. Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site*

These studies have centered around how to best protect surface water quality in Blacktail Creek and Silver Bow Creek downstream of its confluence with Blacktail Creek, given the



physical limitations of the BPSOU. As a result, EPA and DEQ have modified and expanded the surface water remedy (including additional groundwater capture) to provide for more extensive and more detailed remediation than what was originally specified. However, even with the additional planned remediation, in-stream surface water modeling evaluations indicated there is uncertainty whether Circular DEQ-7 surface water quality standards could be met even after all technically practicable additional remedy components were implemented as explained more fully below. This uncertainty resulted in a detailed TI evaluation that determined the likelihood of meeting remedial goals and ARAR standards for surface water established in the 2006 BPSOU Record of Decision (i.e., Circular DEQ-7 standards) through implementation of a variety of surface water, groundwater, and storm water remedial components. The TI report evaluation analyzed the effectiveness of base flow, normal high flow, and wet weather remedial technologies. The evaluation included planned remedial actions (e.g., sediment removal, stream bank removal, storm water basins) and maximum cleanup scenarios (e.g., diversion of stormwater from the drainage above the Silver Bow Creek confluence with Blacktail Creek to the Berkeley Pit for treatment).

The TI evaluation (EPA 2018a) determined that the TI waivers of acute standards for copper and zinc are justified for surface water under wet weather flow regimes only for these specific COCs because, in large part, surface water coming into the BPSOU during wet weather events was already above the water quality criteria. There was a high level of certainty associated with this finding. The report's findings are detailed in the next section.

These additional studies, evaluations and remedial design activities have resulted in the need for one fundamental change and six significant changes to the original remedy as described below. This record of decision amendment also includes 13 minor modifications for the purpose of documenting them in the administrative record (Appendix A).

### 3.1 Fundamental Change to the Original 2006/2011 Remedy

Under CERCLA, ARAR standards that initially apply to a site cleanup can be waived and replaced by other protective standards, where appropriate, if it is technically impracticable from an engineering perspective to meet those initial standards. This is known as a TI waiver.

The TI evaluation made the following conclusions for the different surface water flow regimes:

- **TI waiver for total recoverable copper and zinc for wet weather flow conditions.** Total recoverable copper and zinc are highly unlikely to meet Circular DEQ-7 acute water quality standards during most wet weather flow conditions, regardless of measures used to control COCs within BPSOU. Thus, these standards are waived as technically impracticable and replaced with the federal recommended aquatic life criteria. The replacement water quality



standards are called “waived-to performance standards.” In general, the same hardness-based numerical formulae apply, but the analysis done on in-stream surface water samples is for dissolved metals as opposed to the State’s DEQ-7 total metals-based standards. A dissolved conversion factor is applied, and there is no minimum or maximum value for hardness.

- **Potential post-construction waivers for base and normal high flow conditions.** Under base flow and normal high flow conditions, chronic total recoverable copper and lead Circular DEQ-7 standards may be met after additional stormwater controls are constructed and near and in-stream mine waste removals and contaminated groundwater capture are completed. However, because the TI evaluation demonstrated there is uncertainty associated with meeting these contaminant standards, these performance standards could be waived and replaced but only if necessary. Post-remediation monitoring will have to show exceedances occurred more than once in 3 years and were not due to a malfunction of the remedy or could not be corrected by additional remedial actions before these standards are waived and replaced by federal water quality criteria.
- **Potential post-construction waivers for wet weather conditions.** Under wet weather conditions, acute total recoverable cadmium, lead, and silver Circular DEQ-7 standards may be met after the storm water control systems are expanded, contaminated groundwater discharge to the creeks is controlled in accordance with the SWMP, and other remediation actions are taken. However, because the TI evaluation demonstrated there is uncertainty associated with meeting these contaminant standards, these performance standards could also be waived and *replaced* but only if necessary. Post-remediation monitoring will have to show exceedances occurred more than once in 3 years and were not due to a malfunction of the remedy or could not be corrected by additional remedial actions before these standards are waived and replaced by federal water quality criteria.

Reasons why the Circular DEQ-7 in-stream water quality performance standards cannot be met for all COCs under all flow conditions include:

- **Size.** Silver Bow Creek is a small stream<sup>1</sup> with limited ability to assimilate contaminated storm water. During runoff events, flow from uncontrolled storm water drainages can easily exceed base flow in the stream channel. Sometimes most of the water in Silver Bow Creek is storm water runoff.

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<sup>1</sup> The harmonic mean flow for Silver Bow Creek within the BPSOU is 10 cubic feet per second.



- **Upstream contamination.** During storm events, Blacktail Creek, upstream of BPSOU, often exceeds State of Montana DEQ-7 standards, preventing water quality standards from being met downstream within BPSOU.
- **Lack of space.** Few locations are available to contain and manage the contaminated storm water from Butte Hill.
- **Widespread sources of copper and zinc.** Mine waste was used throughout Butte as fill for road beds and municipal infrastructure. There is no one place or group of places that can be remediated that will fix all the storm water issues.
- **Other Sources.** An active mine in Butte, other typical urban sources of arsenic and metals and some areas of naturally occurring arsenic and metals contamination within the BPSOU contribute somewhat to in-stream water COC concentrations.

EPA does not waive ARARs without considerable site understanding and analysis and an alternative remedial strategy that is protective of human health and the environment. In this case, the waived-to standards are the water quality criteria set by EPA under its Clean Water Act authority. The federal standards, combined with the extensive additional cleanup work described in this record of decision amendment, including additional contaminated groundwater control from discharge to surface water, and contaminated sediment removal, monitoring and management, are protective of aquatic receptors and suitable to use as waived-to performance standards. Because in-stream human health standards must also be met and the replacement standards are more stringent than the human health standards, human health is protected. Furthermore, the remedy is being expanded to include additional cleanup actions associated with the surface water component of the remedy. The surface water TI evaluation report, the proposed plan describing the additional remedial actions (EPA 2018), and the other documents addressing these issues (see Section 1.3) are available in the EPA administrative record for the BPSOU.

### 3.2 Significant Changes to the Original 2006/2011 Remedy

Even though many confounding factors at the BPSOU make it impracticable to meet all of the Circular DEQ-7 water quality performance standards during storm events, the magnitude and frequency of those exceedances will be significantly reduced through implementation of the rest of the surface water remedy. EPA and DEQ, jointly referred to as the agencies, incorporated new data and analysis along with the community's desire to increase the amount of mine waste removals in the Silver Bow Creek and Blacktail Creek floodplain areas, while also allowing future land uses identified by the community wherever it was practicable, into this record of decision amendment.



The TI evaluation not only provided justification for a waiver of specific ARARs, but it also helped show which remedial elements would be the most effective. The work elements for surface water developed by the agencies during the TI evaluation include greater specificity in the BMPs for storm water (locations and sizes of detention basins), significant expansion of the mine waste removal in Silver Bow Creek floodplain areas associated with BMP implementation, expansion of waste removal in the Blacktail Creek floodplain area, and rerouting of a portion of Silver Bow Creek around and away from the contaminant source at the Butte Reduction Works and slag canyon area accompanied with significant removal of mine wastes in this area to create a clean floodplain. Additional contaminated groundwater capture will be required in all areas where contaminated groundwater is adversely impacting sediments or surface water quality of Blacktail and Silver Bow Creeks within the BPSOU in accordance with the SWMP. Other changes to the surface water remedy include clarification of the option for augmentation of flow to attain remedial goals and removal of the contingency to install a conventional treatment plant for chemical treatment of storm water and removal of the need to evaluate and implement infiltration barriers in the Diggings East and Northside Tailings areas (because mine waste not saturated by groundwater in these areas will be removed instead). The rationale behind these changes and maps depicting their extent are provided in Section 5.

#### **4.0 DESCRIPTION OF THE FUNDAMENTAL CHANGE TO THE REMEDY**

Waiver of existing State of Montana water quality standards for specific COCs under specific circumstances is the sole fundamental change for this record of decision amendment. The change has two components: initial waivers and contingent post-construction waivers. This section presents the storm water component as presented in the 2006/2011 BPSOU Record of Decision and the changes to that component made by the amended remedy. Details of the amended remedy are based on evaluation of extensive additional data obtained since the 2006/2011 BPSOU Record of Decision (including the TI evaluation), State of Montana input, and the community's desire to increase the amount of mine waste removals in the Blacktail Creek and Silver Bow Creek areas, while also allowing potential future end land uses identified by the community.

##### **4.1 The Remedy Established in the 2006/2011 Record of Decision Remedy**

As described in the 2006/2011 BPSOU Record of Decision, an overall remedial goal for Silver Bow Creek is to maintain the in-stream concentration of site-specific COCs (aluminum, arsenic, cadmium, copper, iron, lead, mercury, silver, and zinc) below the numeric surface water quality standards identified in Circular DEQ-7 for all flow conditions throughout the length of Blacktail Creek, Grove Gulch Creek, and Silver Bow Creek below its confluence with Blacktail Creek within and directly downstream of the BPSOU. These standards, with the exception of aluminum, are all based on the total recoverable sample fraction comparison to DEQ-7 standards.



The BPSOU ROD requires an EPA-approved comprehensive, long-term surface water monitoring program that will include collection of compliance and diagnostic flow and chemistry data for normal flow and wet weather conditions in receiving surface waters and within intermittent storm water conveyances at the BPSOU.

#### **4.2 The 2020 Selected Remedy in the 2020 Record of Decision Amendment**

##### **4.2.1 Modification of Performance Standards**

EPA's modification to the 2006/2011 BPSOU Record of Decision includes waivers of the existing surface water standards both up-front and in the event of contingencies as described below. Tables 1 and 2 provide details of the initial and contingent post-construction waivers and lists COCs for which no waivers are anticipated. Table 1 shows the performance standards for each COC under base flow and normal high flow conditions (chronic conditions), and Table 2 shows the performance standards for each COC under wet weather flow (acute standards).



**Table 1.** In-Stream Chronic Surface Water Performance Standards and Proposed Waived-to Chronic Performance Standards (Base Flow and Normal High Flow Conditions)

COC	2006 Record of Decision Standard <sup>a</sup>	Update for 2020 Amendment		Contingent Post-Construction Waiver <sup>b</sup>	
	Basis: DEQ-7, February 2006	New Standard	Basis and year published	Waived-to Standard if needed	Basis and year published
Aluminum <sup>c</sup>	87 µg/L, dissolved	No change			
Arsenic	10 µg/L, total	No change			
Cadmium <sup>d,e</sup>	0.097 µg/L, total	0.26 µg/L, total	DEQ-7, 2017 updated <sup>2</sup>	None – currently in compliance.	
Copper <sup>d</sup>	2.85 µg/L, total	No change <sup>3</sup>		<i>Contingent waiver to BLM<sub>f</sub></i>	Federal CCC, 2007
Iron	1,000 µg/L, total	No change			
Lead <sup>d</sup>	0.545 µg/L, total	No change		<i>Contingent waiver to 0.54 µg/L, dissolved</i>	Federal CCC, 1980, with diss.CF (1998)
Mercury	0.05 µg/L, total	No change			
Silver	No chronic standard for silver				
Zinc <sup>d</sup>	37 µg/L, total	No change			

**Notes:**

Abbreviations: µg/L = micrograms per liter; mg/L = milligrams per liter; BLM = Biotic Ligand Model; diss. CF = dissolved conversion factor; total = total recoverable or unfiltered sample; CCC = criterion continuous concentration (i.e., chronic)

**Bold italic** font indicates a waiver.

- 2006 BPSOU Record of Decision standards based on February 2006 version of DEQ-7 and represent the more stringent of the Chronic Aquatic or Human Health Standard.
- Numeric replacement performance standards in this table are based on published federal water quality criteria, issued pursuant to section 403(a) of the federal Clean Water Act, 33. U.S.C. § 1314(a). See <https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table>. All contaminants will be eligible for replacement to other federally accepted performance standards for determining compliance if necessary
- DEQ-7 standards for aluminum refer to the dissolved fraction and do not represent a waiver of a performance standard.
- Standards for cadmium, copper, lead, and zinc are hardness-dependent. Values shown are calculated at a hardness of 25 mg/L unless otherwise shown. Formulas to obtain **chronic** standards in µg/L are shown as follows (exp=exponent and ln=log natural):

COC	Montana DEQ-7 formula (total)	Federal CCC (dissolved)	Dissolved CF
Cadmium	$\exp\{0.7977*[\ln(\text{hardness})]-3.909\}$	$\exp\{0.7977*[\ln(\text{hardness})]-3.909\}*CF$	$1.101672-\ln(\text{hardness})*(0.041838)$
Copper	$\exp\{0.8545*[\ln(\text{hardness})]-1.702\}$	$\exp\{0.8545*[\ln(\text{hardness})]-1.702\}*CF$	0.96
Lead	$\exp\{1.273*[\ln(\text{hardness})]-4.705\}$	$\exp\{1.273*[\ln(\text{hardness})]-4.705\}*CF$	$1.46203-[\ln(\text{hardness})*(0.145712)]$
Zinc	$\exp\{0.8473*[\ln(\text{hardness})]+0.884\}$	$\exp\{0.8473*[\ln(\text{hardness})]+0.884\}*CF$	0.986

- Montana DEQ-7 hardness-based standards for the total recoverable fraction have a minimum and maximum hardness range of 25 to 400 mg/L
  - The Federal CCC or CMC hardness-based standards do not have a minimum or maximum hardness, and the contaminant specific dissolved correction factor should be applied.
  - Conversion Factor introduced in 1998 publication of recommended water quality criteria (Federal Register v.63, No. 237, pp. 68354-68364).
- The cadmium standards are updated according to the May 2017 version of DEQ-7.
  - The BLM criterion in place at the time of compliance standard determination shall be the Replacement Standard for copper for both chronic and acute conditions.

<sup>2</sup> The cadmium standard adopted here varies slightly from the DEQ-7 promulgated standard, which is 0.25 µg/L, based on EPA's calculation for the cadmium standard at a hardness of 25 mg/L using the formula in footnote d which is identical to the formula in footnote 12 of DEQ-7 resulting in a standard of 0.26 µg/L.

<sup>3</sup> As used in Tables 1 and 2, "No change" indicated no initial waiver of these standards. Contingent waiver values are expressed in the "Waived to Standard" column of Tables 1 and 2.



**Table 2.** In-Stream Acute Surface Water Performance Standards and Proposed Waived-to Acute Performance Standards (Wet Weather Conditions)

COC	2006 Record of Decision Standard <sup>a</sup>	Waiver <sup>b,c</sup> or Update for 2020 Amendment		Contingent Post-Construction Waiver <sup>c</sup>	
	Basis: DEQ-7, February 2006	New Standard	Basis and Year Published	Waived-to Standard if needed	Basis and Year Published
Aluminum <sup>d</sup>	750 µg/L, dissolved	No change			
Arsenic	340 µg/L, total	No change			
Cadmium <sup>e,f</sup>	0.52 µg/L, total	0.49 µg/L, total	DEQ-7, 2017 updated	<i>Contingent waiver to 0.49 µg/L, dissolved</i>	Federal CMC, 2016, with diss. CF
Copper <sup>e</sup>	3.79 µg/L, total	<i>3.6 µg/L, dissolved</i>	Federal CMC, 1995, with diss. CF (1998)	<i>Contingent waiver to BLM<sup>g</sup></i>	Federal CMC, 2007
Iron	No acute standard for iron				
Lead	13.98 µg/L, total	No change		<i>Contingent waiver to 14 µg/L, dissolved</i>	Federal CMC, 1980, with diss. CF (1998)
Mercury	1.7 µg/L, total	No change			
Silver <sup>e</sup>	0.374 µg/L, total	No change		<i>Contingent waiver to 0.30 µg/L, dissolved</i>	Federal CMC, 1980, with diss. CF (1998)
Zinc <sup>e</sup>	37 µg/L, total	<i>36 µg/L, dissolved</i>	Federal CMC, 1995, with diss. CF (1998)	<i>Contingent waiver to the applicable Federal standard at time of Compliance Standard Determination</i>	

**Notes:**

Abbreviations: µg/L = micrograms per liter; mg/L = milligrams per liter; BLM = Biotic Ligand Model; diss. CF = dissolved conversion factor; total = total recoverable or unfiltered sample; CMC = criterion maximum concentration (i.e., acute); ***Bold italic*** font indicates a waiver

- 2006 BPSOU Record of Decision standards based on February 2006 version of DEQ-7 and represent the Acute Aquatic Standard.
- DEQ-7 standards for acute copper and zinc are waived and replaced with federal water quality criteria based on section 121(d)(4)(C) of CERCLA, 42 U.S.C. § 9621(d)(4)(C), referred to as the technical impracticability waiver.
- Numeric replacement performance standards in this table are based on published federal water quality criteria, issued pursuant to section 403(a) of the federal Clean Water Act, 33 U.S.C. § 1314(a). See <https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table>. All contaminants will be eligible for replacement to other federally accepted performance standards for determining compliance if necessary
- DEQ-7 standards for aluminum refer to the dissolved fraction and do not represent a waiver of a performance standard.
- Standards for cadmium, copper, lead, silver, and zinc are hardness-dependent. Values shown are calculated at a hardness of 25 mg/L unless otherwise shown. Formulas to obtain ***acute*** standards in µg/L are shown as follows (exp=exponent and ln=log natural):

COC	Montana DEQ-7 formula (total)	Federal CMC (dissolved)	Dissolved CF
Cadmium	$\exp\{0.9789 \cdot [\ln(\text{hardness})] - 3.866\}$	$\exp\{0.9789 \cdot [\ln(\text{hardness})] - 3.866\} \cdot \text{CF}$	$1.136672 - [\ln(\text{hardness}) \cdot (0.041838)]$
Copper	$\exp\{0.9422 \cdot [\ln(\text{hardness})] - 1.7\}$	$\exp\{0.9422 \cdot [\ln(\text{hardness})] - 1.7\} \cdot \text{CF}$	0.96
Lead	$\exp\{1.273 \cdot [\ln(\text{hardness})] - 1.46\}$	$\exp\{1.273 \cdot [\ln(\text{hardness})] - 1.46\} \cdot \text{CF}$	$1.46203 - [\ln(\text{hardness}) \cdot (0.145712)]$
Silver	$\exp\{1.72 \cdot [\ln(\text{hardness})] - 6.52\}$	$\exp\{1.72 \cdot [\ln(\text{hardness})] - 6.59\} \cdot \text{CF}$	0.85
Zinc	$\exp\{0.8473 \cdot [\ln(\text{hardness})] + 0.884\}$	$\exp\{0.8473 \cdot [\ln(\text{hardness})] + 0.884\} \cdot \text{CF}$	0.978

- Montana DEQ-7 hardness-based standards for total recoverable fraction have a minimum and maximum hardness range of 25 to 400 mg/L
- The Federal CCC or CMC hardness-based standards do not have a minimum or maximum hardness, and the contaminant specific dissolved correction factor should be applied.
- Conversion Factor introduced in 1998 publication of recommended water quality criteria (Federal Register v.63, No. 237, pp. 68354-68364).

- The cadmium standards are updated according to the May 2017 version of DEQ-7.
- The Biotic Ligand Model (BLM) criterion in place at the time of compliance standard determination shall be the Replacement Standard for copper for both chronic and acute conditions. For acute conditions (wet weather events), the BLM standard or any other appropriate EPA-approved methodology that will perform in non-equilibrium conditions such as storm water or diel pH cycling shall be used. The criteria for defining frequency for collection of individual parameters will be defined in the Surface Water Monitoring Plan.



The modified selected remedy includes:

- Waiver of the State of Montana's Circular DEQ-7 acute aquatic life standards for copper and zinc based on a total recoverable (unfiltered) sample and adopt the federal acute aquatic life standards based on a dissolved (filtered) sample as shown on in Table 2. This change to federal acute aquatic life standards based on a dissolved sample is protective of surface water in the BPSOU because all contaminated sediments will be removed and replaced with clean sediments and the contaminant pathways to these sediments will be addressed with the additional remedial actions now required.
- Adoption of the current Circular DEQ-7 allowance for one exceedance of water quality standards in 3 years. This exceedance rate allowance was accounted for in the TI evaluation and applies to both the chronic and acute standards.
- Adoption of the updated Circular DEQ-7 aquatic life standard for cadmium (May 2017). This change applies to both the chronic and acute standards (Tables 1 and 2). Because the cadmium standard is not waived initially, the new Circular DEQ-7 standard will apply unless the contingent post-construction waiver is invoked.
- Modification of point of compliance as described in Appendix A. As described in the 2006/2011 BPSOU Record of Decision, an overall remedial goal for Silver Bow Creek is to maintain the in-stream concentration of site-specific COCs below the numeric surface water quality standards identified in Circular DEQ-7 for all flow conditions throughout the length of Blacktail Creek, Grove Gulch Creek, and Silver Bow Creek below its confluence with Blacktail Creek within and directly downstream of the BPSOU. This surface water compliance requirement from the 2006/2011 BPSOU Record of Decision (Section 12.6.6.2) will be changed to two points of compliance at SS-06G and SS-07 only (Figure A-3). Other monitoring stations will remain in the network as needed, but compliance will be determined at these two farthest downstream stations. Effluent from the Butte wastewater treatment plant enters between SS-06G and SS-07. The surface water sampling methodology will be modified to allow for additional compositing methods at the compliance sampling locations.

After implementation of the remedy (post-construction) and a period of monitoring, the following waivers will be granted, if necessary, based on



post-construction surface water monitoring data and in accordance with the SWCDP:

- If after a period of monitoring of 9 to 12 years, acute performance standards (cadmium, lead, and silver) for these previously unwaived COCs are not met, waivers of these standards will be granted but only after construction of these portions of the remedy are completed and shown to be functioning as intended. The waived-to standards are shown in Table 2.
- If after a period of monitoring of 9 to 12 years, chronic performance standards (copper and lead) for these previously unwaived COCs are not met, waivers of these standards will be granted but only after construction of these portions of the remedy are completed and shown to be functioning as intended. The waived-to standards are shown in Table 1.
- If after a period of monitoring of 9 to 12 years, dissolved acute performance standards for copper and zinc are not met, further waivers to the federal water quality criteria in place at that time may be granted but only after construction of these portions of the remedy are completed and shown to be functioning as intended. These waived-to standards are shown in Table 2.

For aluminum, arsenic, and iron, no changes to the human health or aquatic life standards based on Circular DEQ-7 at the time of the 2006 BPSOU Record of Decision are necessary as these COCs are in compliance currently. These are summarized for reference in Tables 1 and 2.

#### **4.2.2 Modification of Surface Water RAOs**

RAOs presented in the 2006 BPSOU Record of Decision for contaminated surface water remain unchanged for this amendment, except for the need to waive certain Circular DEQ-7 standards (DEQ 2017) to federal water quality criteria.

The two modified RAOs are shown below, with the modification in italics. The other RAOs (see Section 2.5) remain unchanged.

- Prevent source areas from releasing contaminants to surface water that would cause the receiving water to violate surface water ARARs and remedial goals (*or replacement standards for ARARs appropriately waived*) for the BPSOU and prevent degradation of downstream surface water sources, including during storm events.



- *Meet or appropriately waive and replace* the more restrictive of chronic aquatic life or human health standards for surface water identified in Circular DEQ-7 through the application of B-1 class standards.<sup>4</sup>

## 5.0 DESCRIPTION OF SIGNIFICANT CHANGES

Although many factors at the BPSOU make it impracticable to meet copper and zinc water quality performance standards during storm events, it is possible to significantly reduce the magnitude and frequency of exceedances through implementation of the surface water remedy. Work elements for surface water developed by the agencies during the TI evaluation represent four of the six significant changes to the original remedy and are described in Sections 5.1 through 5.3. Three components in the 2006/2011 BPSOU Record of Decision are rendered unnecessary by the modifications and will be removed as part of the selected alternative (5.4 through 5.6). The original remedy component for each is summarized and compared to the selected alternative. Table 3 provides a side-by-side comparison of the six significant changes to the original surface water remedy as modified by this 2020 BPSOU Record of Decision Amendment.

### 5.1 Expand Mine Waste Removal in Silver Bow Creek and Blacktail Creek Areas

#### 5.1.1 2006/2011 Remedy Component – Waste Removal from Blacktail and Silver Bow Creek Channels

COCs occur in stream sediments, the stream banks, and nearby floodplain from Blacktail Creek above the confluence and through Silver Bow Creek to Lower Area One. The original remedy required excavation of contaminated sediment, stream banks, and adjacent floodplain wastes from the reach of Blacktail Creek just above the confluence with Silver Bow Creek down to the reconstructed floodplain and stream channel in Lower Area One.

The original 2006/2011 remedy also included removal of contaminated sediments, stream banks, and nearby floodplain wastes and contaminated soils to minimize impacts to surface water quality. The stream and floodplain were required to be reconstructed according to an EPA-approved design. After waste removal, further evaluation of surface water quality in this area was required. If contaminated groundwater inflow was found to adversely affect surface water quality, additional hydraulic controls and groundwater capture was required to be implemented.

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<sup>4</sup> “B-1 waters are suitable for drinking, culinary, and food processing purposes after conventional treatment; bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply,” Montana Clean Water Act.



#### **5.1.2 2020 Selected Remedy**

While the removal of contaminated sediments, stream banks, and nearby floodplain wastes was included in all of the alternatives considered for the selected remedy in the 2006/2011 BPSOU Record of Decision and is an established remedial component, the scope of the removals required under this amendment is more extensive than envisioned in the original remedy. The expanded scope is based on extensive data collected in these areas and these wastes' impact to surface water and sediment quality and in part on significant public input on additional waste removals. Additional hydraulic control of contaminated groundwater discharge to the creeks is also included in this remedial action rather than leaving it as a contingency. The 2020 selected remedy also includes action in the stream corridor areas shown in Figure 4.



**Table 3. Significant Changes to the Original Remedy**

Existing Record of Decision (2006/2011)		2020 Record of Decision Amendment	
Component	Description of Component	Expansion	Description of Modified Remedy
<b>Sediment and Waste Removal</b> from Blacktail and Silver Bow Creek Channels, Banks, and Floodplains	<ul style="list-style-type: none"> <li>Excavate contaminated sediment, stream banks, and adjacent floodplain wastes from the reach of Blacktail Creek above its confluence with Silver Bow Creek, and Silver Bow Creek through the Butte Reduction Works, and down to the reconstructed floodplain and stream channel in Lower Area One.</li> </ul>	<p><b>Expand waste removals</b> in streams upstream and downstream of confluence.</p> <p><b>Move Silver Bow Creek</b> out of the slag canyon area of BRW.</p>	<ul style="list-style-type: none"> <li>Based on analysis of data collected during remediation and extensive public input, expand removals and require additional hydraulic control.</li> <li><b>Upstream direction.</b> Add bank sediment and nearby floodplain waste removal along Blacktail Creek (George Street to Grove Gulch).</li> <li><b>Downstream direction.</b> Remove tailings, slag, contaminated soils, and other waste from Butte Reduction Works (southern portion of the site) to allow Silver Bow Creek to be moved into the new corridor (Figure 4).</li> </ul>
Surface Water Management for <b>Base Flow Remediation</b>	<ul style="list-style-type: none"> <li>Groundwater control and capture is primary component of remedial action addressing surface water contamination during base flow conditions.</li> <li>Add appropriate hydraulic controls and groundwater capture if groundwater not captured by the existing capture systems is found to discharge to and adversely affect surface water quality.</li> </ul>	<b>Expand contaminated groundwater control and capture</b> system anywhere within BPSOU where surface water (at points of compliance) or sediment quality is adversely impacted (as described in the SMWP) through the addition of capture systems to be determined during remedial design.	<ul style="list-style-type: none"> <li>Install contaminated groundwater controls in Butte Reduction Works area to keep contaminated groundwater there from discharging to Silver Bow Creek. Install similar controls along Blacktail Creek.</li> <li>Route contaminated groundwater from new systems to the Butte Treatment Lagoons for treatment.</li> <li>To address end land use concerns and input, revegetate and provide a public area for possible recreational use—a continuous link between remedies upstream (Blacktail Creek and Silver Bow Creek above the confluence with Blacktail Creek) and downstream (through Lower Area One).</li> </ul>
Surface Water Management for <b>Storm Water Remediation</b> – Iterative BMP Program	<ul style="list-style-type: none"> <li>Use iterative process to implement BMPs and monitor to meet water quality performance standards in a 15-year time frame.</li> <li>Specific BMPs are not prescribed but could include storm water ponds if appropriate.</li> </ul>	<b>Remove mine waste to construct storm water controls</b> in Silver Bow Creek above the confluence with Blacktail Creek.	<ul style="list-style-type: none"> <li>Construct final storm water controls (primarily detention basins) to settle out contaminated suspended sediments from Buffalo Gulch and drainages reporting to Silver Bow Creek above the confluence with Blacktail Creek for 10-year storm event.</li> <li>Remove buried tailings in Silver Bow Creek above the confluence with Blacktail Creek at Diggings East and Northside Tailings to accommodate new basins. <i>This is in response to evaluation of the data and public input.</i></li> <li>Removed waste that meets the criteria for disposal in a mine waste repository will be disposed in one of the following locations: the proposed Timber Butte repository [see figure 5] near the Copper Mountain Sports Complex or the approved Butte Mine Waste Repository, as determined to be appropriate.</li> </ul>
Surface Water Management for Storm Water Remediation – <b>Storm</b>	<ul style="list-style-type: none"> <li>Capture/treat storm water runoff if BMPs do not achieve goal of meeting surface water performance standards in Silver Bow Creek during storm water events.</li> </ul>	<b>Remove contingency requirement</b> for storm water treatment.	<ul style="list-style-type: none"> <li>Total recoverable copper and zinc are highly unlikely to meet Circular DEQ-7 acute water quality standards during most wet weather flow conditions regardless of measures</li> </ul>



<b>Water Treatment Contingency</b>	<ul style="list-style-type: none"> <li>Evaluate amount of storm water that could practicably be treated. Collect and treat storm flows (up to maximum practicable design criterion) by lime precipitation in a newly constructed plant.</li> </ul>		<p>implemented to control COCs, including treating storm water in a treatment plant.</p> <ul style="list-style-type: none"> <li>Storm water capture and conventional treatment is impracticable due to space and technical limitations.</li> <li>Detention basins treat storm water by settling suspended solids making this contingency unnecessary.</li> </ul>
<b>In-Stream Flow Augmentation Contingency</b>	<ul style="list-style-type: none"> <li>Add off-site source water, if needed, to supplement surface water remedial components to improve flow and quality of water in Silver Bow Creek but only after the major remedial components are designed and implemented.</li> </ul>	<b>Remove</b> flow augmentation contingency.	<ul style="list-style-type: none"> <li>The modified remedy would be protective without the need for flow augmentation.</li> <li>Butte Mine Flooding OU's eventual treated water discharge may fulfill this contingency, but the timeline for that water is unknown and may be decades in the future. No other likely water sources are available (the active mine imports water).</li> </ul>
<b>Evaluation of Infiltration Barriers</b>	<ul style="list-style-type: none"> <li>Evaluate infiltration barriers over wastes in the lower portion of Silver Bow Creek above the confluence with Blacktail Creek corridor below Harrison Avenue (Diggings East and Northside Tailings).</li> </ul>	<b>Remove requirement</b> for evaluation of infiltration barriers	<ul style="list-style-type: none"> <li>With removal of mine wastes that are not saturated by groundwater at the Diggings East and Northside Tailings to accommodate storm water basins, this requirement is no longer necessary.</li> </ul>







Based on the analysis of additional surface water, sediments, sediment pore water, groundwater, and near-stream solid media, EPA and DEQ determined that the 2006/2011 BPSOU Record of Decision remedy did not sufficiently address areas upstream that are impacting surface water. In the upstream direction, the remedy will be expanded by adding sediment, stream bank and floodplain waste removal along Blacktail Creek from Montana Street to Grove Gulch. In the downstream direction below Montana Street, tailings, slag, contaminated soils, sediments and other waste from the Butte Reduction Works will be removed from the southern portion of the Butte Reduction Works area to allow Silver Bow Creek to be moved out of the slag canyon area of Butte Reduction Works and into the new, cleaner corridor.

## **5.2 Expand Contaminated Groundwater Control and Capture System West and South of BPSOU Subdrain**

### **5.2.1 2006/2011 Remedy Component – Surface Water Management for Base Flow Remediation**

The groundwater component of the 2006/2011 BPSOU Record of Decision remedy is the primary remedial action addressing surface water contamination during base flow conditions. As a contingency, the original remedy included implementation of additional, appropriate groundwater controls and groundwater capture if groundwater that is not captured by the existing groundwater capture systems was found to discharge to surface water and adversely affect surface water quality.

### **5.2.2 2020 Selected Remedy**

Contaminated groundwater that discharges to Blacktail or Silver Bow Creeks that adversely impacts sediment quality anywhere within BPSOU will be addressed with the selected remedy in accordance with the SWMP. If contaminated groundwater impacts surface water quality at the two compliance points (SS-06G and SS-07) it also will be addressed by remedy.

At the Butte Reduction Works site, Silver Bow Creek will be relocated away from its current course through what is known as slag canyon, and into a newly remediated corridor to the south. All wastes in this remediated southern corridor will be removed. Because mine waste saturated by groundwater will be left in-place to the north of the relocated creek, groundwater controls will be installed to keep the resulting contaminated groundwater from discharging to the reconstructed creek channel or to other areas of Silver Bow Creek.

Expanded contaminated groundwater controls will also be installed along Blacktail Creek to keep contaminated groundwater from discharging into



Blacktail Creek or the Confluence Areas. Mine waste removals upgradient from these areas, including the Parrot Tailings Waste Removal Project conducted by the State under its natural resource damage authority, will reduce the contaminant loading to groundwater.

Contaminated groundwater from these new and any other necessary systems will be routed for treatment at the Butte Treatment Lagoons or an alternate equivalent treatment facility.

The remediated areas will be revegetated and may provide the public with an area for possible recreational use and a continuous link between the remedies upstream in Blacktail Creek and Silver Bow Creek above the confluence with Blacktail Creek and downstream through Lower Area One.

### **5.3 Remove Mine Waste to Construct Storm Water Controls**

#### **5.3.1 2006/2011 Remedy Component – Iterative BMP Program for Storm Water Remediation**

The remedy in the 2006/2011 BPSOU Record of Decision established an iterative process of implementing and monitoring BMPs as part of a surface water management program for storm water remediation, with the goal of meeting water quality performance standards within a 15-year time frame. The original remedy did not prescribe specific BMPs to be constructed. Storm water basins were among many BMPs identified in the 2006 BPSOU Record of Decision that could be used if appropriate.

#### **5.3.2 2020 Selected Remedy**

The 2020 selected remedy requires construction of specific storm water controls (primarily detention/retention basins) to settle out contaminated suspended sediments from Buffalo Gulch and the drainages reporting to Silver Bow Creek above the confluence with Blacktail Creek for the 10-year storm event. Certain stormwater controls addressing a 6 month/24-hour storm event will be added to certain drainages within the BPSOU. Tailings, waste, and contaminated soils above high groundwater levels in Silver Bow Creek above the confluence with Blacktail Creek at the Diggings East and Northside Tailings will be removed to accommodate the new basins. In these areas, tailings, wastes, and contaminated soils outside of the basins and within 3-feet of the high groundwater elevation will be removed. These removals of wastes are also in response to public input received. Removed waste that meets the criteria for disposal in a mine waste repository will be disposed in one of the following locations: the proposed Timber Butte repository (see Figure 5) near the Copper Mountain Sports Complex or the approved Butte Mine Waste Repository, as determined to be appropriate.



#### **5.4 Clarify Flow Augmentation Contingency**

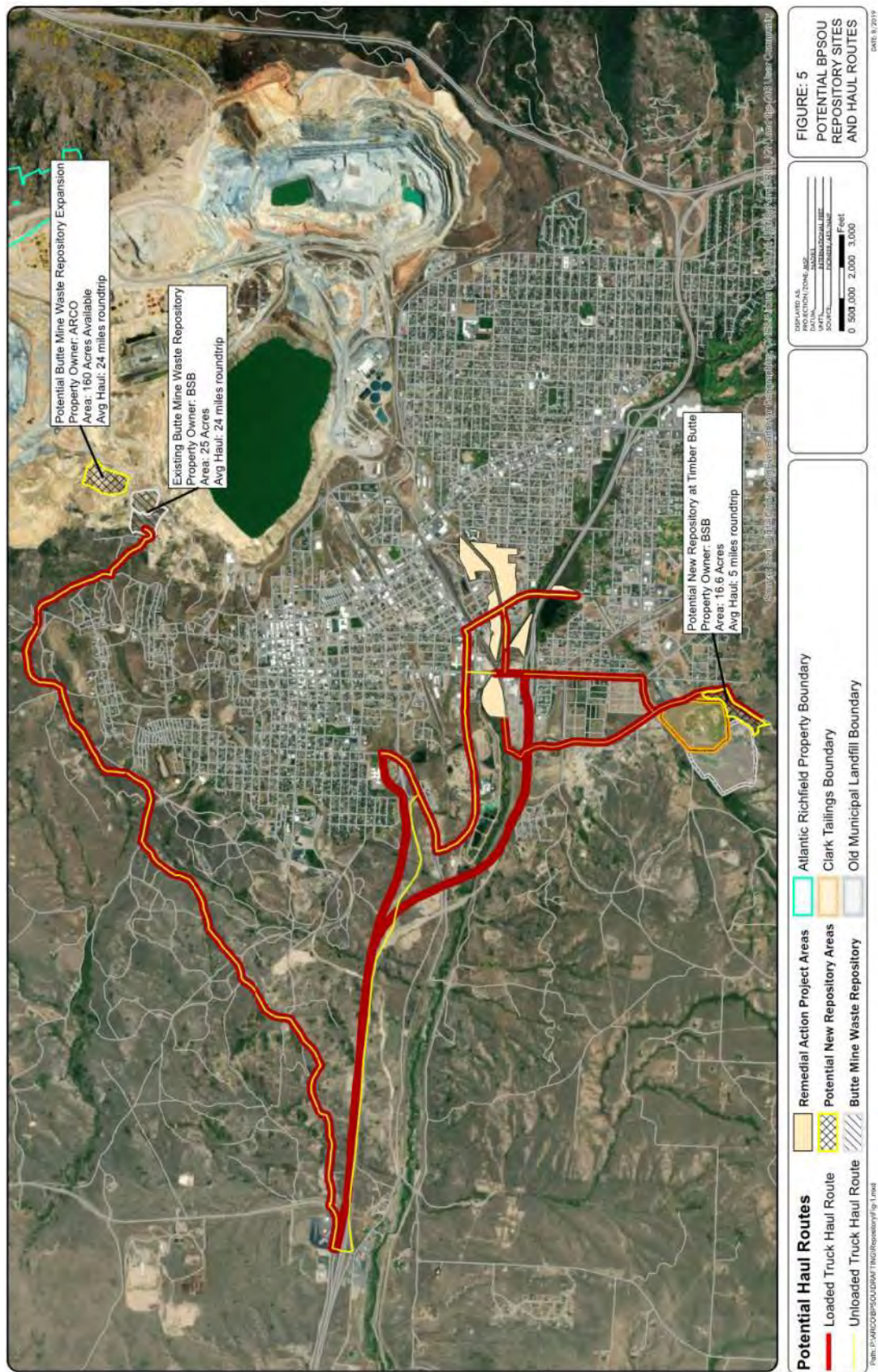
##### **5.4.1 2006/2011 Remedy Component – In-Stream Flow Augmentation Contingency**

The remedy in the 2006/2011 BPSOU Record of Decision included the possible addition of off-site source water if necessary, to supplement surface water remedial components to improve the flow and quality characteristics of the water within Silver Bow Creek, but only after the major remedial components described in the 2006/2011 BPSOU Record of Decision were designed and implemented.

##### **5.4.2 2020 Selected Remedy**

The in-stream flow augmentation contingency could potentially be fulfilled by the addition of treated water discharge from the Butte Mine Flooding Operable Unit. No other feasible major water sources for flow augmentation are available (additional imported water is being used at the active mine in Butte). Although discharge of treated water is occurring through a pilot study, the timeline for perennial water discharge from the Butte Mine Flooding Operable Unit is unknown, and a discharge may be decades in the future, depending on how treated water is used in the mine operations. Because of these factors, the agencies have developed the remedy for surface water to be protective without the need for flow augmentation.







## **5.5 Clarify Storm Water Treatment Contingency**

### **5.5.1 2006/2011 Remedy Component – Storm Water Treatment Contingency**

The remedy in the 2006/2011 BPSOU Record of Decision remedy included capture and treatment of storm water runoff if BMPs implemented under the Surface Water Management Program do not achieve the goal of meeting surface water performance standards (Circular DEQ-7 standards) in Silver Bow Creek during storm water events. In addition, an evaluation of the amount of storm water that could practicably be treated would be performed. Storm flows up to the maximum practicable design criterion would then be collected and treated by lime precipitation technology. If treatment was required, a conventional lime treatment plant would be constructed for this purpose.

### **5.5.2 2020 Selected Remedy**

The conclusions of the TI analysis indicate that total recoverable copper and zinc are not likely to meet acute water quality performance standards (i.e., Circular DEQ-7 standards) during most wet weather flow conditions, regardless of the measures implemented to control the COCs (including treating storm water at a conventional water treatment plant). Capture and conventional treatment of storm water was determined to be impracticable due to technical and space limitations. The basins described above will treat storm water by settling of suspended solids, making this contingency unnecessary.

## **5.6 Remove Requirement for Infiltration Barriers on the Parrot Tailings, Diggings East and Northside Tailings Mine Waste Areas**

### **5.6.1 2006/2011 Remedy Component – Evaluation and Implementation of Infiltration Barriers**

The remedy in the 2006/2011 BPSOU Record of Decision remedy allowed buried and/or saturated solid media in Lower Area One and Silver Bow Creek above its confluence with Blacktail Creek to remain in place with appropriate groundwater monitoring and institutional controls. To reduce the loading of COCs to groundwater from the Parrot Tailings, the Diggings East, and Northside Tailings, infiltration barriers were to be considered during remedial design and implemented if determined to be appropriate by EPA in consultation with DEQ.

### **5.6.2 2020 Selected Remedy**

The need to evaluate infiltration barriers at the Northside and Diggings East Tailings areas is no longer necessary under the modified remedy as the wastes above groundwater in these areas will be removed and the area will be used for storm water management with lined retention/detention basins.



This evaluation is also not necessary for the Parrot Tailings area, as this area is being addressed through the removal of tailings, waste, and impacted soils above and below groundwater as defined in the State's Parrot Tailings Waste Removal Project conducted under State of Montana natural resource damage authority.

## **6.0 EVALUATION OF MODIFICATION**

CERCLA requires that any fundamental change to a record of decision be evaluated using the nine criteria specified in the NCP and used for all remedial decisions under the Superfund program. The evaluation ensures the remedy can meet EPA's mission of protecting human health and the environment.

The 2020 Record of Decision Amendment's selected remedy for surface water remediation was first evaluated against the two threshold criteria, which must be met for an alternative to move forward. The five primary balancing criteria were then used to compare the 2006/2011 BPSOU Record of Decision remedy to the modified selected remedy. Evaluation against the two modifying criteria was made after the public comment period ended. Results of the evaluation are presented below.

### **6.1 Threshold Criteria**

The amendment's modification was required to meet the two threshold criteria in order to move forward.

#### **6.1.1 Overall Protection of Human Health and the Environment**

The modified remedy must protect human health and the environment, in both the short and long term, from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site by eliminating, reducing, or controlling exposures to levels established during development of remediation goals consistent with 40 CFR § 300.430(e)(2)(i).

The amendment's modification is protective in several ways:

- Federal replacement standards for copper and zinc during wet weather events are based on the dissolved (filtered) sample fraction comparison to appropriate water quality standards and are national surface water quality criteria promulgated by EPA pursuant to the Clean Water Act. While not as conservative as Montana standards, they are protective of aquatic life in this circumstance when accompanied by the additional contaminated sediment removal from the creeks and stormwater control components described above, and sediment monitoring and management described in the SWMP (EPA 2019d). Because in-stream human health standards must also be met and the replacement standards



are more stringent than the human health standards, human health is protected.

- Contaminated groundwater capture and removal of contaminated sediments, stream banks, and nearby floodplain wastes was found to be protective in the 2006/2011 BPSOU Record of Decision. Expansion of areas where mine waste is removed and where contaminated groundwater is collected for treatment will provide additional effectiveness because it will improve water quality under both types of flow conditions (base and high flow). Removal of wastes to accommodate storm water BMP construction will further reduce a source of contamination to groundwater.
- In contrast to the approach to storm water control in the 2006/2011 BPSOU Record of Decision, the amendment includes specificity for installation of storm water detention/retention basins and other measures. Basins will improve surface water quality in two ways:
  - Suspended sediment containing COCs will settle out before being released, resulting in lower total recoverable COC concentrations.
  - Water storage will significantly reduce the number of times per year that untreated storm water will be released to surface water, resulting in fewer potential exceedances of performance standards.

#### **6.1.2 Compliance with ARARs**

The amendment's selected remedy must comply with ARARs or provide grounds for invoking one of the waivers under section 121(d)(4) of CERCLA, 42 U.S.C. § 9621(d)(4). Waiver of certain in-stream surface water standards and use of federal replacement standards for copper and zinc during wet weather events is compliant with the CERCLA statute and its waiver provisions. The CERCLA statute allows ARARs to be waived based on an evaluation that they are technically impracticable from an engineering perspective.

Replacement performance standards (Table 2) for acute copper and zinc during wet weather events are based on the dissolved (filtered) sample fraction and are national surface water quality criteria enacted by EPA pursuant to the Clean Water Act. Based on the results of the TI evaluation, these waivers will be granted prior to any further remedial action taking place in BPSOU. They are protective of aquatic life in this circumstance because the existing contaminated sediments will also be removed, replaced with clean materials, monitored and managed in the creeks. Because in-



stream human health standards must also be met and the replacement standards are more stringent than the human health standards, human health is protected.

The TI evaluation showed uncertainty in the ability of some standards to be met even after remediation. Thus, the selected remedy also includes contingent waivers for surface water ARARs (Tables 1 and 2)—specifically for copper and lead (chronic conditions) and cadmium, lead, and silver (acute conditions) after construction of the remedy. The waivers will be activated only if exceedances are measured *after* the remedy is implemented, the agencies have had an opportunity to evaluate the performance of the remedy, and in accordance with DEQ regulations governing in-stream exceedance allowances in Circular DEQ-7, all as described in the SWCDP.

## **6.2 Primary Balancing Criteria**

Five primary balancing criteria were used to weigh the amendment's selected remedy against the original remedy.

### **6.2.1 Long-term Effectiveness and Permanence**

This criterion assesses the long-term effectiveness and permanence and certainty that the alternative will prove successful. Surface water waivers do not impact remedy performance. Expansion of waste removals, contaminated groundwater controls, and contaminated storm water controls increases long-term effectiveness and permanence and reduces long-term operation and maintenance. Removal of contaminated sediment, stream banks, and nearby floodplain waste was thoroughly evaluated for the 2006/2011 BPSOU Record of Decision and was found to be effective and permanent. The selected remedy expands these existing waste removals and ensures that the Silver Bow and Blacktail Creeks flow through clean remediated areas.

Storm water controls are limited by land availability; thus, there will be times when design capacities are exceeded and untreated storm water discharges to surface water. This may recontaminate sediment and reduce long-term effectiveness. However, the magnitude of recontamination is expected to be less under the selected remedy. Between extreme events, input of less-contaminated sediment from upstream may result in lower COC concentrations.

Contaminated groundwater will be controlled at any locations along Blacktail and Silver Bow Creeks within BPSOU where it is adversely impacting surface water at compliance locations or sediment quality



anywhere as detailed in the SWMP (EPA 2019d). Recontaminated sediment will be removed, if necessary, and replaced with clean materials resulting in a notable improvement in long-term effectiveness and permanence.

Long-term operations and maintenance of the storm water basins and other BMPs are critical components of the remedy. With proper operations and maintenance, the storm water basins are expected to be an effective measure for capturing and removing COCs and contaminated sediment in storm water and are comparable in effectiveness to a storm water treatment plant.

#### **6.2.2 Reduction of Toxicity, Mobility, or Volume**

This criterion assesses the degree to which the modification uses recycling or treatment that reduces toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the site. There is no significant difference in reduction of toxicity, mobility, or volume of solid wastes between the 2006/2011 BPSOU Record of Decision and the selected remedy.

The amended remedy increases the rate, volume, and locations of contaminated groundwater collection and treatment in certain areas to prevent discharge of contaminated groundwater to surface water. These actions reduce the toxicity and mobility of contaminants through hydraulic control and treatment.

The physical removal of sediments, banks, and floodplain waste materials under the selected remedy will reduce toxicity and mobility of mining wastes by removing them from the in-stream or near-stream environment. Volumes of those materials will not change with removal from one location to another. Removal of tailings from storm water BMP areas will reduce mobility of COCs to groundwater. Surface water waivers do not impact this criterion.

Little or no treatment of the primary mining wastes will occur as part of the remedy because they are removed from one location (floodplain environments) to another (secure repositories) without treatment. In the feasibility study that preceded the 2006 BPSOU Record of Decision, active treatment was screened out as a potential option for solid media.

Physical removal of sediments in storm water through settling in the basins is considered treatment. Toxicity and mobility of contaminants in storm water are anticipated to be considerably reduced with use of storm water basins. As runoff from wet weather and snowmelt events enter the basins, contaminants will be removed through settling. Accumulated sediments



will periodically be removed from the basins during routine operations and maintenance. There will be no active treatment of these sediments.

### **6.2.3 Short-term Effectiveness**

This criterion assesses short-term impacts of the selected remedy during implementation, including potential risks to the community, impacts on workers, environmental impacts, and time until protection is achieved. There is no significant difference in short-term effectiveness between the 2006/2011 BPSOU Record of Decision remedy and the selected remedy.

Construction activities will use standard equipment, such as excavators and trucks. This type and scale of construction is common locally. Haul routes, either to Timber Butte Repository or the Mine Waste Repository, can be developed to pose lower risks to workers and the community. Other risks, such as those from dust and storm water runoff during construction, can be mitigated.

Removal of sediments will likely include isolating surface waters into half of the channel and removing sediment in a partially dewatered environment. Working in relatively short sections will ease environmental impacts. Work in stream beds and banks may cause short-term adverse impacts on water quality. Impacts may continue through reconstruction and restabilization (the first one or two high flow events) but COC loading reductions occur thereafter. Waste removals away from flowing surface water will have no short-term effects.

Storm water basins will be effective immediately and will reduce total recoverable concentrations of COCs in captured storm water through settling. The basins will reduce peak flow rates from Butte Hill drainages, mitigating the peak load of contaminated storm water entering surface water.

### **6.2.4 Implementability**

This criterion assesses the ease or difficulty of implementation, including technical and administrative feasibility and availability of services and materials. Implementability of the amendment's selected remedy is slightly increased in comparison to the 2006/2011 BPSOU Record of Decision, primarily because of elimination of the potential construction of a storm water treatment plant under the selected remedy increases implementability.

The modified surface water remedy components are readily implementable. Construction of additional storm water basins and expansion of mine waste removals and contaminated groundwater capture areas use techniques of a



type and scale common to the BPSOU. Materials and services needed are readily available nearby.

Rerouting Silver Bow Creek around and away from contaminant sources at the Butte Reduction Works and slag canyon area is implementable. It is similar to stream reconstruction work performed at Lower Area One in the late 1990s and the SSTOU. The construction techniques are similar to those commonly used at BPSOU, and materials and services needed are readily available.

#### **6.2.5 Cost**

Expanded mine waste removal area and waste volumes for the amendment's selected remedy are substantially larger than those envisioned in the 2006/2011 BPSOU Record of Decision. As such, removal costs are expected to be greater for these elements. The 2006/2011 BPSOU Record of Decision did not identify installation of specific storm water basins, but the proposed basins and other stormwater features described in the 2020 Record of Decision amendment are similar to the sediment basins and other stormwater controls found in the original Record of Decision. Costs associated with the stormwater treatment plant contingency and the infiltration barrier contingency, which are removed through this record of decision amendment, reduce the cost of overall remedy by approximately \$48 million (2006 BPSOU Record of Decision Tables 12-3, 12-5, and 12-8). However, those reduced costs are offset by increased costs of approximately \$44 million for the larger waste removals necessary for constructing the stormwater basins (\$13 million), for removing waste upstream in Blacktail Creek (\$5 million), for removing waste in the Butte Reduction Works area (\$15 million), for storm water controls in the Grove Gulch area (\$1 million), for expansion of the Butte Residential Metals Abatement Program (\$3 million), and for additional hydraulic controls for Blacktail Creek and Butte Reduction Works areas (\$7 million). The net cost change from the original 2006 BPSOU Record of Decision is estimated to be an overall reduction of approximately \$4 million from the \$157 million remedy cost estimated in the 2006 BPSOU Record of Decision which falls within the acceptable -30% to +50% cost range.

### **6.3 Modifying Criteria**

The two final criteria, state and community acceptance, were evaluated after the public comment period ended.

#### **6.3.1 State Acceptance**

This criterion discusses the state's position and key concerns related to the record of decision amendment's modifications. The State of Montana,



acting through DEQ, is in agreement with the surface water TI waiver and modifications to the surface water remedy which implement technically practicable measures to restore and protect surface water quality.

### **6.3.2 Community Acceptance**

Community acceptance was assessed based on comments received on the proposed plan. EPA received a variety of comments on the April 2019 *Proposed Plan for a BPSOU Record of Decision Amendment*. Some comments were generally supportive of the amended remedial plan. Other comments were opposed to the waiver of DEQ-7 acute copper and zinc water quality standards, the omission of the waste removal of the Parrot Tailings area under the amended remedy, and the lack of requirements to re-construct Silver Bow Creek in the area above the confluence with Blacktail Creek to the Montana Resources active mine boundary, among other issues. Community comments were carefully considered by the agencies and specific responses to comments are provided and addressed in Appendix B. Many of the comments received identify issues that can be addressed during the remedial design of the specific components of the amended BPSOU remedy.

End land use for the Silver Bow Creek area above the confluence with Blacktail Creek was of particular concern to many community residents. Although not a remedy element, EPA has worked with the State of Montana and the responsible parties to develop detailed end land use plans that will accommodate many of the community end land use plans for this area and for other areas of a remediated Silver Bow Creek and Blacktail Creek within the BPSOU. EPA will continue to work with these parties, the community and EPA's Technical Assistance Grant recipient to implement and accommodate these end land use plans as the remedy implementation process proceeds.

## **7.0 STATUTORY DETERMINATIONS**

The types of actions to be completed in the selected remedy presented in this 2020 BPSOU Record of Decision Amendment are essentially the same as the remedy presented in the 2006 BPSOU Record of Decision. The amended remedy is more specific, and the extent or scale of action is somewhat larger, but the applicability to statutory determination are unchanged. Therefore, the statutory determination section presented in the 2006 BPSOU Record of Decision is still accurate. A summary of these determinations are as follows.

The selected remedy presented in this amendment satisfies CERCLA § 121 requirements as it is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost-



effective, and uses permanent solutions and alternative treatment technologies to the maximum extent possible.

The remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. Active treatment of mining waste would be significantly more expensive due to the large quantities of materials impacted. Although they are present in large volumes, the solid materials within the BPSOU are generally low in toxicity and can be reliably removed or contained.

Because the remedy, as amended, results in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within 5 years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

#### **Documentation of Significant Changes from Proposed Plan**

There are no significant changes in this record of decision amendment from those described in the *2019 Proposed Plan for a BPSOU Record of Decision Amendment*.

### **8.0 PUBLIC PARTICIPATION**

Under CERCLA § 117(c), 42 U.S.C. § 9617(c), and the NCP, 40 CFR § 300.435(c)(2)(ii), EPA must publish proposed changes to existing remedies that fundamentally alter the basic features of a selected remedy with respect to scope, performance, or cost and provide the public an opportunity for comment on the proposed changes. Changes proposed for the BPSOU fundamentally alter the basic features of the 2006/2011 remedy, prompting the issuance of a proposed plan for amendment of the BPSOU 2006/2011 Record of Decision.

As documented below, the public participation requirements set out in the NCP have been met through the proposed plan and public comment process:

- EPA issued a proposed plan that highlighted proposed changes to the original surface water remedy on April 11, 2019.
- A public notice regarding issuance of the plan and the start of the public comment period was placed in the *Montana Standard* (April 11, 2019) and *Butte Weekly* (April 17, 2019).
- A 60-day public comment period ran from April 11, 2019 to June 11, 2019.
- EPA hosted two public meetings at the Montana Tech Campus Library Auditorium, 1300 West Park St., in Butte from 6:00-8:30 p.m. on April 23 and May 23, 2019. A reminder ad for the second meeting ran on May 21, 2019. Copies of the proposed plan and a fact sheet were provided at the meetings.



- A 30-day extension to the comment period was requested, and it was extended through July 11, 2019. A public notice of the extension was published in the *Montana Standard* and *Butte Weekly*.
- The proposed plan and the supporting administrative record were available throughout that period on the EPA website and at the Montana Tech Library.
- Public comment was received and evaluated prior to finalization of the 2020 Record of Decision Amendment.
- EPA received comments from 101 separate entities/individuals on the proposed plan during the public comment period. A responsiveness summary, which includes each comment, criticism, and/or new relevant information submitted, followed by a response to each, is included as Appendix B of this document.
- EPA will publish a notice of the availability of the amended record of decision in the *Montana Standard* and *Butte Weekly*.
- This 2020 Record of Decision Amendment is a part of the administrative record for the BPSOU and is available at each information repository for public review prior to the commencement of the remedial action described herein.

In addition to the above, the community's desire is to increase the amount of mine waste removals in Silver Bow Creek above the confluence with Blacktail Creek area to allow for future land uses. This desire was incorporated into the remedial elements wherever practicable.

## 9.0 REFERENCES

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EPA. 2018. *Groundwater and Surface Water Interaction Report. Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site.* U.S. Environmental Protection Agency.

EPA. 2019a. *Surface Water Technical Impracticability Evaluation Report. Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site.* U.S. Environmental Protection Agency.

EPA. 2019b. *Proposed Plan to Amend the 2006/2011 Record of Decision, Butte Priority Soils Operable Unit.* U.S. Environmental Protection Agency, April.

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EPA and DEQ. 2019. *Description of the Wet Weather Remedial Element, Butte Priority Soils Operable Unit of the Silver Bow Creek / Butte Area Superfund Site.*







**Appendix A**  
**Minor Modifications to the Original Remedy**



Thirteen minor modifications to the original remedy for the BPSOU are presented below for the purpose of documenting them in the administrative record.

### **1. Clarify and Expand BPSOU Boundary**

There are three areas where boundary adjustments were made (Figure A-1). The first revision to the boundary incorporates both banks of Grove Gulch to just upstream of its confluence with Blacktail Creek. In this area, the original boundary traced Kaw Avenue instead of explicitly including the east bank of Grove Gulch on the east side of Kaw Avenue. The revised boundary is also expanded east to accommodate a proposed small storm water basin upstream of where Grove Gulch crosses the interstate. The second revision was made around the Diggings East source area. The original boundary adjacent to the Diggings East source area did not fully incorporate this area and it was revised to accommodate a proposed stormwater basin along with the areas that are planned to be remediated. The third revision was made along the border of the BPSOU and the Butte Mine Flooding operable unit. This change was made to match the BPSOU boundary to the BMFOU boundary. The remainder of the BPSOU boundary is unchanged.

### **2. Change and Expand RMAP Boundary**

The 2006 BPSOU Record of Decision allows for residential cleanup expansion, as needed. In 2011, the Residential Metals Abatement Program (RMAP) attic dust program was expanded to areas south and west of the BPSOU boundary, encompassing the southern urban area of Butte. This modification expands the RMAP boundary further to encompass rural residential development (outside the BPSOU) to the north, south, and west, including Rocker, and to exclude the Beal Mountain, Solvay, and Continental Mine areas (Figure A-2). Work in the expanded area will include all RMAP facets (soils, living area dust, lead-based paint, and attic dust) except for the property-by-property systematic sampling and assessment approach. Properties outside the BPSOU boundary but within the RMAP expansion area will be sampled by request only.

### **3. Revise Points of Compliance and Determination of Compliance**

As described in the 2006/2011 BPSOU Record of Decision, an overall remedial goal for Silver Bow Creek is to maintain the in-stream concentration of site-specific COCs below the numeric surface water quality standards identified in Circular DEQ-7 for all flow conditions throughout the length of Blacktail Creek, Grove Gulch Creek, and Silver Bow Creek below its confluence with Blacktail Creek within and directly downstream of the BPSOU. The prescriptive surface water monitoring of the 2006/2011 BPSOU Record of Decision (Section 12.6.6.2) will be simplified to points of compliance at SS-06G and SS-07 (Figure A-3). Other monitoring stations will remain in the network as needed, but compliance will be determined at these two farthest downstream stations. Effluent from the Butte wastewater treatment plant enters between SS-06G and SS-07. The surface water sampling methodology will be modified to allow for additional compositing methods at the compliance sampling locations.

### **4. Simplify Compliance Determination**

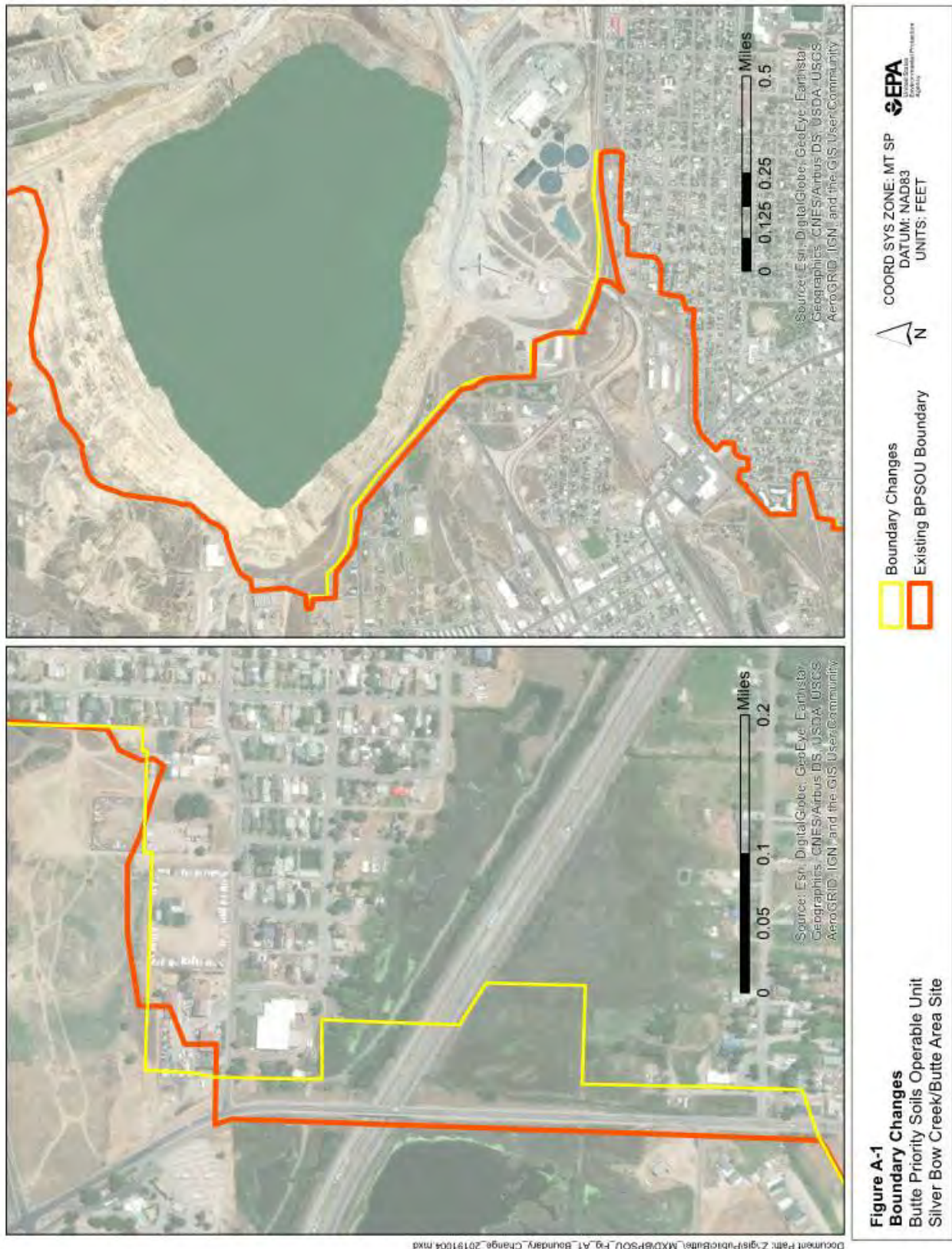
The 2006/2011 BPSOU Record of Decision specified a flow-weighted concentration approach to determining compliance. The modified approach is simpler. Upstream and downstream samples



will be collected, regardless of flow conditions in the creek. If concentrations from downstream stations exceed the performance standard, concentrations would be compared to those measured at the upstream station. Upstream stations can be modified or changed with EPA and DEQ approval. If the concentration upstream is greater than downstream, the downstream sample is in compliance.



**Figure A-1. Boundary Changes**





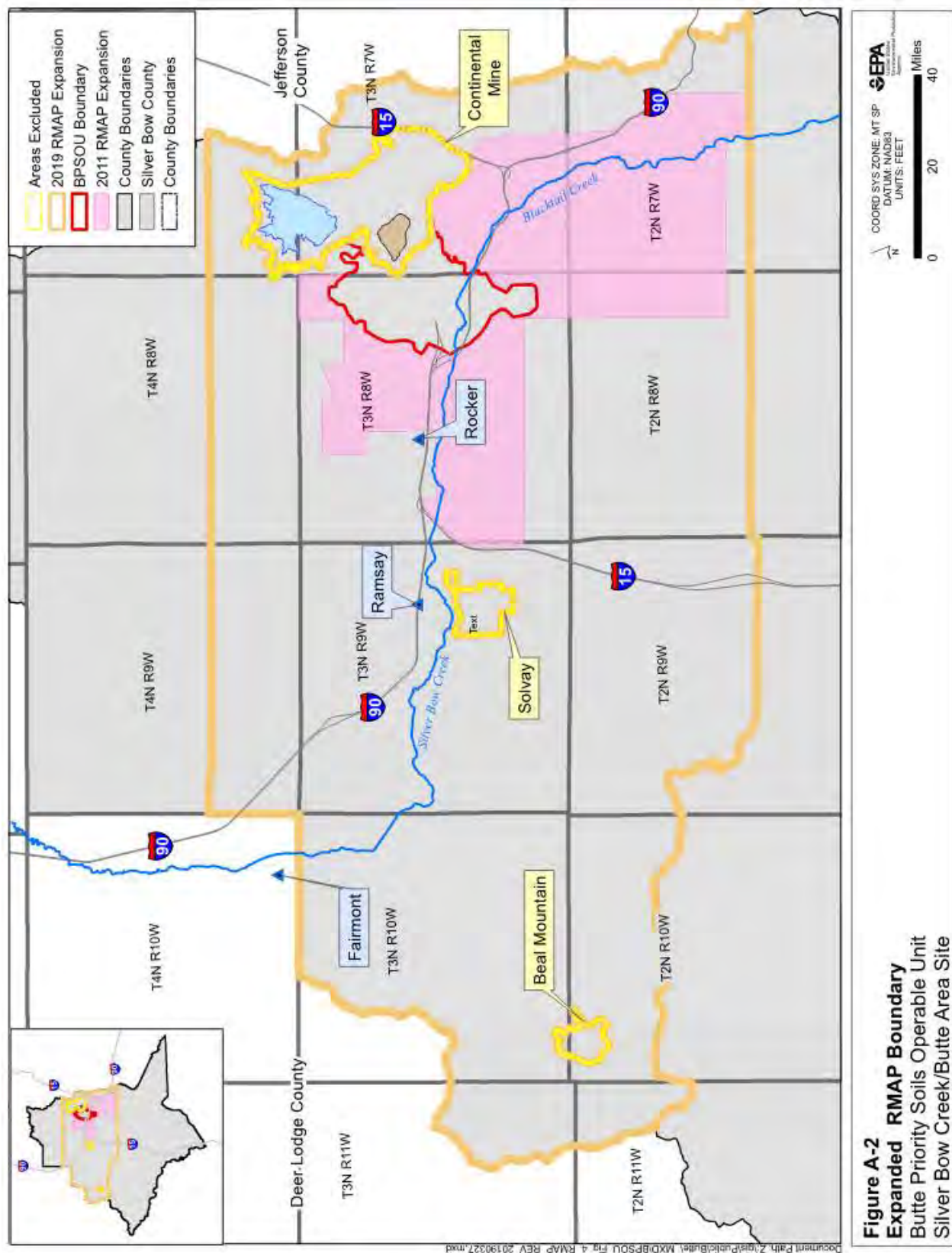
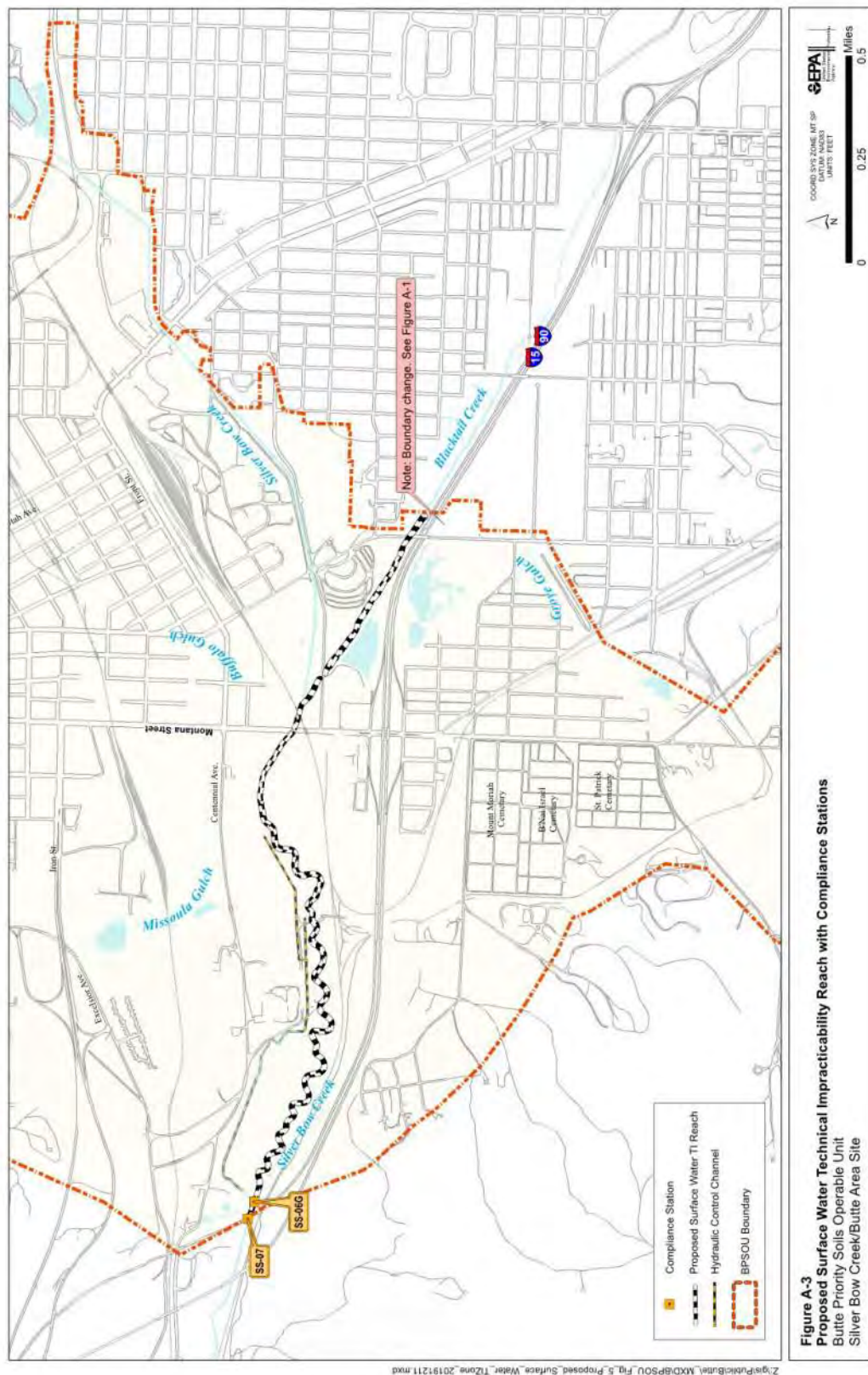
**Figure A-2. Boundary Changes.**



Figure A-3. Surface Water Technical Impracticability Reach with Compliance Stations.





**5. Allow Sludge Dewatering, Drying, and Management**

The 2006/2011 BPSOU Record of Decision stated that the Butte Reduction Works area would not be used for Butte Treatment Lagoon sludge management. However, with approved modifications and upgrades to the Butte Treatment Lagoons, a safe and protective area for sludge management was developed and is now allowed for use. Sludge from the lagoons is now dried nearby and then disposed of in the Butte Mine Waste Repository.

**6. Revise Definition of Wet Weather Events for Surface Water Flow Regime**

For compliance monitoring, wet weather flow conditions and wet weather events will be defined as when there is measurable outflow from any of the primary outlets of the following main existing or planned storm water basins within the BPSOU: CB-9 in Missoula Gulch, the Diggings East basin, the Buffalo Gulch basin, and the East Buffalo Gulch/Northside Tailings basin.

**7. Modify West Camp Pumping Level Requirements**

Water levels will be allowed to exceed the specified elevation described in the 2006/2011 BPSOU Record of Decision for brief periods to provide short-term additional capacity in the Butte Treatment Lagoons for operational flexibility. Under the 2006/2011 BPSOU Record of Decision, the West Camp bedrock groundwater level must be kept below an elevation of 5,435 feet through pumping and then treatment in the Butte Treatment Lagoons. With this modification, if additional capacity is temporarily needed in the lagoons, pumping from West Camp may be paused. A temporary resultant rise in groundwater elevation in the West Camp well is allowed.

**8. Modify RMAP Target Numbers**

Numbers per year for sampling and remediation are modified from those stated in the 2006/2011 BPSOU Record of Decision to account for additional remediation at properties that are visited multiple times (e.g., for remodels and re-roofing, when Butte-Silver Bow (BSB) County returns to a previously remediated property multiple times).

**9. Correct Lead Bioavailability Percentage Used**

The integrated exposure uptake biokinetic lead model used to set soil action levels for lead-contaminated soil in BPSOU was run with a bioavailability of 12 percent for soil and 30 percent for indoor dust per the risk assessment. The 2006 BPSOU Record of Decision misstated these as 10 percent for both in Section 7.1.2.

**10. Correct Test Animals Used**

Bioavailability studies for lead and arsenic described in the 2006 BPSOU Record of Decision used rats and swine, not monkeys and swine. The 2006 BPSOU Record of Decision misstated this in both Sections 7.1.2 and 7.1.3.

**11. Better Describe Mandate for Future Health Studies**

The 2006/2011 BPSOU Record of Decision requires future human health studies on a periodic basis but does not specifically describe their exact nature. The modification specifies:



- Butte-Silver Bow County, as the lead responsible party for this action, will periodically evaluate medical monitoring (i.e., biomonitoring) data approaches and data compiled under the medical monitoring program every 5 years for a period of 30 years. The first of these studies was completed and approved by EPA in 2014. Five additional periodic medical monitoring studies will be conducted over the next 25 years. Other reviews and potential health studies may be conducted to expand beyond medical monitoring data through discussions with the stakeholder group as these studies continue, and as funding is available, with the Butte-Silver Bow County Health Department as the lead agency in coordinating these reviews and studies. The Agency for Toxic Substances and Disease Control and the Montana Department of Public Health and Human Services will be substantially involved in this effort, along with EPA and DEQ. As the expanded RMAP program is developed, EPA and DEQ will work with community members and Butte Silver Bow County to continually address public health concerns associated with historical mining waste and current public health issues to the extent practical and as funding is available.
- Reports documenting these periodic evaluations will respect the personal privacy of the participants and will be available to the public, EPA, DEQ, and potentially responsible parties for the BPSOU.
- All stakeholder parties will continue to facilitate, participate, and contribute to the Medical Monitoring Working Group and other public health reviews and studies.

## **12. Confirm Compliance with Human Health ARARs for Surface Water is Not Required During Wet Weather Conditions**

As noted above, in-stream surface water quality must meet human health standards in normal flow conditions. The replacement standards are more stringent than human health standards. Human health exposure pathways of concern, which focus on drinking water consumption and consumption of fish, are not likely to occur during acute, wet weather events.

## **13. Use of the Names Metro Storm Drain and MSD Subdrain**

Site documents and the 2006 BPSOU Record of Decision referred to the storm water channel and subdrain between the Montana Resources concentrator and the Visitor's Center as the Metro Storm Drain and MSD subdrain. In accordance with a 2015 decision from State district court, any future reference will now be Silver Bow Creek. Where there is a need to identify a specific geographic area within Silver Bow Creek, documents will reference Silver Bow Creek above or below the confluence with Blacktail Creek and BPSOU subdrain.



## **APPENDIX B**

### **RESPONSIVENESS SUMMARY**



**RESPONSIVENESS SUMMARY**  
**for the**  
**BUTTE PRIORITY SOILS OPERABLE UNIT**  
**of the**  
**SILVER BOW CREEK/BUTTE AREA**  
**SITE**

**Butte and Walkerville, Montana**

**Appendix B to the**  
**Record of Decision Amendment**

**U.S. Environmental Protection Agency**  
**Montana Department of Environmental Quality**



## TABLE OF CONTENTS

<b>LIST OF TABLES.....</b>	<b>iii</b>
<b>ACRONYMS AND ABBREVIATIONS.....</b>	<b>iv</b>
<b>1.0 INTRODUCTION .....</b>	<b>1</b>
1.1 Overview and Background.....	1
1.2 Community Involvement Activities .....	2
1.3 Overview of Comments Received.....	8
1.4 Protocol for Addressing Comments .....	10
<b>2.0 PUBLIC COMMENTS AND RESPONSES .....</b>	<b>10</b>
2.1 Action Levels .....	11
2.2 Adaptive Management .....	16
2.3 Air Quality .....	17
2.4 Allocation Agreement .....	21
2.5 BPSOU Expansion .....	22
2.6 Bull Trout Impacts .....	24
2.7 Community Involvement.....	30
2.8 Condemnation of Private Property .....	39
2.9 Controlled Groundwater Area Boundary .....	41
2.10 Cost in Remedial Decision-Making .....	41
2.11 Economic Development .....	42
2.12 End Land Use Plan and the Consent Decree .....	46
2.13 Environmental Justice .....	47
2.14 Flooding .....	49
2.15 Funding .....	50
2.16 Groundwater.....	55
2.17 Health Studies .....	61
2.18 Impacts to Butte-Silver Bow Compliance.....	86
2.19 Operable Unit Management .....	87
2.20 Proposed Modification of the 2006/2011 Record of Decision .....	89
2.21 Reclamation.....	104
2.22 Regulatory Process.....	109
2.23 Remedy Effectiveness .....	113
2.24 Risk Issues.....	113
2.25 RMAP Expansion.....	120
2.26 Silver Bow Creek Legal Status .....	133
2.27 Silver Bow Creek above the Confluence Channel Replacement.....	145
2.28 Stormwater Issues .....	167
2.29 Stormwater Retention/Detention Basins .....	179
2.30 Source Erosion to Surface Water .....	190
2.31 Subdrain .....	194
2.32 Surface Water Management Plan .....	195
2.33 Technical Text and Figure Changes for the 2020 Record of Decision Amendment .....	196
2.34 TI Waiver .....	203
2.35 Waste Removal .....	225
2.36 Water Quality District .....	238
<b>3.0 REFERENCES .....</b>	<b>240</b>



## **LIST OF TABLES**

Table 1 List of Topics for Addressing Public Comment and Section Number



## ACRONYMS AND ABBREVIATIONS

µg/dL	micrograms per deciliter
Atlantic Richfield	The Atlantic Richfield Company (also referred to as AR and ARCO in comments)
ARAR	applicable or relevant and appropriate requirement
ATSDR	Agency for Toxic Substances and Disease Registry
BABCGA	Butte Alluvial and Bedrock Controlled Groundwater Area
BMP	best management practice
BPSOU	Butte Priority Soils Operable Unit
BPSOU ROD	2006 BPSOU Record of Decision as amended by the 2011 Explanation of Significant Differences and the 2020 BPSOU Record of Decision Amendment.
BRES	Butte Reclamation Evaluation System
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGWA	controlled groundwater area
CTEC	Citizens Technical Environmental Committee
DEQ	Montana Department of Environmental Quality
DNRC	Montana Department of Natural Resources and Conservation
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Differences
FWS	U.S. Fish and Wildlife Service
HUD	U.S. Department of Housing and Urban Development
IC	institutional control
ID	identification
mg/kg	milligram per kilogram
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ppm	parts per million
RAO	remedial action objective
RMAP	Residential Metals Abatement Program
SARTA	Butte Silver Bow Superfund Advisory and Redevelopment Trust Authority
Site	Silver Bow Creek/Butte Area Superfund Site
TI	technical impracticability
U.S.C.	U.S. Code
WIC	Special Supplemental Nutrition Program for Women, Infants, and Children



## 1.0 INTRODUCTION

### 1.1 Overview and Background

The U.S. Environmental Protection Agency (EPA)—in consultation with the Montana Department of Environmental Quality (DEQ)—conducted a technical impracticability (TI) evaluation (EPA 2018a) of the Butte Priority Soils Operable Unit (BPSOU) of the Silver Bow Creek/Butte Area Superfund Site (the Site) to determine the likelihood of meeting remedial goals and applicable or relevant and appropriate requirement (ARAR) standards for surface water. EPA also conducted new studies examining the current conditions in BPSOU surface water. Based partially on these studies, EPA, in consultation with Montana DEQ, chose to modify the existing 2006 BPSOU Record of Decision (EPA 2006) as it is amended by a 2011 BPSOU Explanation of Significant Differences (ESD) (EPA 2011). These two documents are hereinafter referred to as the 2006/2011 BPSOU Record of Decision.

The proposed modification included two major components:

- Expand removals of mine waste, install additional stormwater best management practices (BMPs), install additional contaminated groundwater capture within BPSOU, and reroute part of Silver Bow Creek in the Butte Reduction Works area.
- Waive two Montana DEQ-7 standards as an initial matter and provide a post-construction determination process to waive others only if noncompliance is demonstrated.

Details of the proposed modification are based on evaluation of data obtained since the 2006/2011 Record of Decision, State of Montana input, and the community's desire to increase the amount of mine waste removals in the Silver Bow Creek area to allow for future land uses.

EPA released the *Proposed Plan to Amend the 2006/2011 Record of Decision, Butte Priority Soils Operable Unit* (EPA 2019d) on April 11, 2019. The plan described proposed changes to the *Record of Decision, Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site* (EPA 2006) as amended by the 2011 ESD for the BPSOU.

A record of decision amendment is required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) at 40 Code of Federal Regulation (CFR) 300.430(f)(3)(F) when fundamental changes to an approved record of decision are made by EPA. EPA prepared a proposed plan and has accepted, evaluated, and responded to public comment as required by the NCP. EPA and



Montana DEQ considered all comments summarized in this document as the decision for amending the BPSOU remedy was made.

In addition, a proposed consent decree has been developed that provides additional details about most of the remedial activities described in the 2020 Record of Decision Amendment. An amended Unilateral Administrative Order also will be issued, which will implement the residential metals abatement portion and the medical monitoring study requirements of the 2020 BPSOU Record of Decision Amendment. For consistency with the consent decree, use of the acronym “BPSOU ROD” in the EPA responses to comments will refer to the end product of the amendment process—the 2006 BPSOU Record of Decision as amended by the 2011 Explanation of Significant Differences and the 2020 BPSOU Record of Decision Amendment. In all other instances, EPA will refer to either the 2006/2011 BPSOU Record of Decision or the 2020 BPSOU Record of Decision Amendment. Commenters tend to use ROD for any record of decision.

This responsiveness summary provides a summary of the public comments submitted to the EPA regarding the proposed plan. EPA’s responses to those comments are also provided. The responsiveness summary is organized as follows:

- Section 1 – Introduction
- Section 2 – Public Comments and Responses
- Section 3 – References Cited

EPA has worked closely with community members and other stakeholders throughout the Superfund process at the BPSOU and the Silver Bow Creek/Butte Area site at large. That cooperation continued into the amendment process. Community participation played an essential role in the development of the proposed plan and the 2020 Record of Decision Amendment and is described in more detail below.

## **1.2 Community Involvement Activities**

EPA’s outreach goal is to educate the community about the work being done at the BPSOU and collaborate with stakeholders on how to successfully engage the public. Extensive work has been done within the BPSOU, in conjunction with Montana DEQ, Butte Silver Bow County, Atlantic Richfield Company (Atlantic Richfield [also AR or ARCO in comments]), Citizens Technical Environmental Committee (CTEC), and the Butte Silver Bow Superfund Advisory and Redevelopment Trust Authority (SARTA), as well as interested individual members of the public.



### **1.2.1 Prior to Proposed Plan**

EPA used public information sessions, fact sheets, websites, one-on-one discussions, and participation in community events as ways to share information about the Site with the broader community. Furthermore, EPA has provided financial support to CTEC since 1984 via a technical assistance grant, which allows a community group to contract their own technical advisor to interpret and explain technical reports, site conditions, and EPA's proposed cleanup proposals and decisions.

EPA made significant community outreach efforts leading up to the release of the proposed plan to get community input and to prepare people to participate in the public comment period. These efforts included producing and disseminating information such as fact sheets; maintaining the information repository at the Montana Tech Library where the public can review documents associated with the BPSOU; maintaining current information on EPA's BPSOU website; supporting CTEC; sustaining strong partnerships with Montana DEQ, the Butte-Silver Bow County officials, and the Butte-Silver Bow Public Health Department to maximize community outreach efforts; and attending and presenting at public forums and meetings.

Additionally, EPA takes environmental justice seriously and has worked to understand environmental justice concerns in the BPSOU by using existing tools (such as EPA's Environmental Justice Screen tool and Community-Focused Exposure and Risk Screening tool), applying the six principles of environmental justice that are outlined in Executive Order 12898 (Environmental Justice: Guidance Under the National Environmental Policy Act), and working with appropriate community groups. EPA will continue to work with interested parties to make sure that future outreach efforts reach historically underrepresented communities.

Specific outreach activities conducted prior to the release of the proposed plan included:

- January 26, 2018 – At a press conference in Butte, EPA's Region 8 Administrator announced a conceptual settlement framework for completing the BPSOU remedial actions.
- April 2018 – The United States and Atlantic Richfield obtained a modification of the federal district court's confidentiality order,



allowing consent decree parties to share information about the further cleanup plans for the BPSOU.

- May 30, 2018 – EPA publicly released a detailed *Further Remedial Elements Scope of Work* (EPA 2018b), describing planned future work, specifically the floodplain waste removal actions planned for the Butte Reduction Works and Blacktail Creek areas (including the Blacktail Berms), additional contaminated groundwater controls, removal of waste and contaminated soils within the Diggings East and Northside Tailings area and construction of lined retention/detention basins in those areas, construction of a lined retention/detention basin in the East Buffalo Gulch drainage, construction of a stormwater control feature in Grove Gulch, construction of other stormwater control features in other parts of Butte, and plans for evaluating and capping, where appropriate, insufficiently reclaimed and unreclaimed mine waste areas. Fact sheets were provided to explain various parts of the conceptual settlement framework and a public comment period was announced.
- May 30 and June 12, 2018 – Two public meetings were held in Butte at the Montana Tech Library auditorium and attended by representatives of EPA, Montana DEQ, Butte Silver Bow County, and Atlantic Richfield. The meetings were held to further explain the *Further Remedial Elements Scope of Work* (EPA 2018b) and to answer questions about the plans.
- June 26, 2018 – Butte-Silver Bow staff presented a summary of the BPSOU conceptual agreement to members of SARTA. The presentation included a summary of Butte-Silver Bow's guiding framework and included a high-level summary of the conceptual agreement and detailed presentations of individual work plans made available to the public.
- July 11–12, 2018 – An information booth was staffed during the Folk Festival where presentation materials available from the May/June public meetings were displayed.
- August 7, 2018 – Two community design workshops were held by Atlantic Richfield at the Butte Brewing conference room in Butte. This was the first in the series that engaged the community in a design charette to develop a vision for the Silver Bow and Blacktail Creek corridor from Casey Street west through the Butte Reduction works.



Representatives of EPA, Montana DEQ, and Butte-Silver Bow were present, as were members of the community.

- August 30, 2018 – The second set of the community design workshops was held by Atlantic Richfield. Outcomes of the August 7, 2018 workshops were presented, and further feedback was solicited to refine concepts for end land use. Representatives of EPA, Montana DEQ, and Butte-Silver Bow were present, as were members of the public.
- September 25, 2018 – Butte-Silver Bow staff presented to SARTA an overview of the community design workshop process for the remediation in the vicinity of Silver Bow Creek and Blacktail Creek. The members requested updates on the schedule for the consent decree to determine how SARTA would assist in soliciting public input and providing recommendations to the Council of Commissioners. SARTA staff began scheduling technical updates, particularly details pertaining to the Parrot Tailings and other remedial work in Butte. A water subcommittee was established to begin to understand the water-related issues integral to well-informed recommendations. This included a tour of existing stormwater infrastructure.
- October 23, 2018 –SARTA hosted the first in a series of Superfund technical seminars with a presentation by the Montana Natural Resource Damage Program to summarize and discuss the Parrot Tailings Waste Removal project, including project goals and a description of how the groundwater saturated mine wastes are being removed. A thorough overview of BPSOU stormwater challenges was provided based on information shared during a tour provided by Butte-Silver Bow.
- November 1, 2018 – The final community design workshop was held by Atlantic Richfield and presented the outcome of the two-part design charette workshops. Presentations were made of end land use concepts for the corridor suggested by participants. Representatives of EPA, Montana DEQ, and Butte-Silver Bow were present, as were members of the community.
- November 27, 2018 – SARTA hosted the second in its series of Superfund technical seminars to inform the public about the foundations of Superfund operations in Butte and technical



components of forthcoming plans and documents associated with the record of decision process and consent decree. Butte-Silver Bow Superfund staff provided an overview of the county's operations program and proposed a schedule for forthcoming presentations in the early part of 2019.

- January 8, 2019 – SARTA hosted a presentation by Atlantic Richfield to discuss Atlantic Richfield's day-to-day operations and technical management of the BPSOU.
- April 9, 2019 – SARTA hosted a presentation by EPA and Montana DEQ entitled, "A Day in the Life," describing their roles and responsibilities to the BPSOU and how those responsibilities dovetail with other operable units at the site. The presentation discussed EPA and Montana DEQ's relationships with their counterparts at Butte Silver Bow and AR and the collaborative approach. SARTA members asked questions pertaining to BPSOU, West Side Soils Operable Unit, and Mine Flooding Operable Unit.

### **1.2.2 After Issuing Proposed Plan**

Specific public engagement activities and other activities were conducted just prior to and after the April 11, 2019 release of EPA's proposed plan to amend the 2006/2011 BPSOU Record of Decision. The NCP requires a 30-day comment period. EPA initially announced a 60-day public comment period and subsequently extended it to 90 days at the request of the public (April 11 to July 11, 2019). All key supporting documents, including a fact sheet prepared by EPA to distill the proposed plan down into two pages, were posted on EPA's BPSOU website. Hard copies of the proposed plan and electronic copies of the complete administrative record were made available at the Montana Tech library and on EPA's Silver Bow Creek/Butte Area website.

The public comment period was announced in the *Montana Standard* and *Butte Weekly* and on EPA's website. Additionally, EPA began notifying specific groups (e.g., CTEC, Restore Our Creek Coalition, SARTA) before issuing the proposed plan.

During the public comment period, EPA held two public meetings. The meetings were advertised days ahead of time in the *Montana Standard* and the *Butte Weekly*. They were held on April 23 and May 23, 2019 at the Montana Tech Auditorium, which is handicapped accessible and within the BPSOU. A formal presentation of the plan was given at each



meeting, followed by a question and answer period and an informal open house where the public could discuss the plan directly with EPA staff and ask questions one-on-one. At both meetings, opportunities were provided for both written and transcribed oral comments on the proposed plan to be taken for the record. Transcripts of the recorded public comments are in the administrative record for the BPSOU record of decision amendment.

Specific outreach activities conducted upon and following the release of the proposed plan included:

- April 11, 2019 – EPA released a proposed plan for amending the 2006/2011 BPSOU Record of Decision and placed the administrative record for the proposed action in the Montana Tech Library and on EPA’s Silver Bow Creek/Butte Area website. EPA published a notification of the availability of the proposed plan and administrative record in the *Montana Standard* and the *Butte Weekly* newspapers and distributed a fact sheet summarizing the proposed plan.
- April 23, 2019 – EPA held the first of two public meetings on the proposed plan at which EPA and Montana DEQ answered questions and took formal public comment.
- May 20, 2019 – Atlantic Richfield and Butte Silver Bow County shared their joint end land use plan describing amenities planned for the area above the confluence of Silver Bow Creek with Blacktail Creek. This plan is the result of the community visioning sessions and design workshops held in summer 2018. The State of Montana also shared its plan for devoting some money from the consent decree proceeds, which are not needed to meet consent decree obligations into an interest-bearing trust, to be used by the community to design and/or construct a lined creek in the Silver Bow Creek area above its confluence with Blacktail Creek. Such funds would be used as a match for other funds secured by the project proponent, if land, water, access, infrastructure, and other issues are resolved at the time a proposed project is presented. The plan concepts were discussed at a meeting attended by Restore our Creek Coalition representatives and other community members on October 31, 2018 at the Butte-Silver Bow Public Archives.
- May 23, 2019 – EPA held the second of two public meetings on the proposed plan.



- May 30, 2019 – Butte-Silver Bow hosted a listening session at the Butte archives to summarize EPA’s proposed plan.
- September 2019 – EPA awarded CTEC an amended grant award to provide for CTEC’s evaluation of end land use possibilities in the area above Silver Bow Creek’s confluence with Blacktail Creek to Texas Avenue, including the possible construction of a lined, meandering creek in this area.
- October 22, 2019 – Butte-Silver Bow provided SARTA an update on the consent decree, noting consensus was reached, generally outlining the document’s structure and elements, reiterating the presently available public information, and describing a proposed public education process prior to bringing the document to the Council of Commissioners for their consideration.

EPA’s efforts to provide opportunities for public participation have met and exceeded the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the NCP. The input EPA received from the public and other stakeholders throughout the Superfund process was instrumental in developing the proposed plan and the 2020 BPSOU Record of Decision Amendment. The ongoing involvement of the community and other stakeholders will remain an important part of the cleanup as it moves forward.

### **1.3 Overview of Comments Received**

A total of 101 individual comment submissions were received. Comments were received by regular mail (letters), email, and as recorded by a stenographer at both public meetings. The submission from Restore Our Creek Coalition included an attachment of a petition with over 1,000 signatures. That petition is acknowledged here and included in the public record, but no attempt was made to verify the signatures nor were the signatories treated as separate commenters.

Each submission was given a sequential individual comment identification (ID) number. For each ID number assigned, basic identification information (i.e., date received, commenter name, comment method [e.g., email, letter, transcript], title, or opening sentence) was tracked. A master spreadsheet tracked assigned ID numbers for the comments made in each submission (e.g., 51.1, 51.2, 51.3).

Names and addresses of individual commenters were recorded and tracked but are not available to the public owing to EPA’s Privacy Policy and commitment to protecting personally identifiable information. Redacted versions of individual



comments are entered into the administrative record supporting the 2020 Record of Decision Amendment. Names of businesses, organizations, and government entities submitting comments are (in alphabetical order):

- Alliance for the Wild Rockies
- Atlantic Richfield Company
- Butte-Silver Bow Chief and Council
- Clark Fork Coalition (referred to as CFC by some commenters)
- CTEC
- Greeley Neighborhood Committee
- Habitat for Humanity
- Restore Our Creek Coalition
- Montana Fish, Wildlife and Parks
- Trout Unlimited

The top 10 general comment categories addressed in Section 2 are shown below:

1. Against many aspects of the modification (35 commenters)
2. Supports the proposed modification (24 commenters)
3. Questions or suggestions related to waste removal (19 commenters)
4. Questions or suggestions related to the health studies (19 commenters)
5. Questions or suggestions about the legal status of Silver Bow Creek (16 commenters)
6. Comments or suggestions about the expansion of the Residential Metals Abatement Program (RMAP) (16 commenters)
7. Technical comments on text or figures relevant to the amendment (12 commenters)
8. Questions or suggestions about community involvement (12 commenters)
9. Against the TI waiver (11 commenters)



10. Supports the TI waiver, has questions about the TI waiver, or has questions about action levels (10 commenters each)

Comments are responded to by the specific topic raised in the individual comments and are not grouped by these categories.

#### **1.4 Protocol for Addressing Comments**

EPA responded only to the portion of the comment that was specific to the changes described in the proposed plan. Comments (or portions of multi-comment submissions) were sorted by topic so that multiple comments could be answered with a single response to avoid repetition. For brevity, introductory or background material that was not relevant to the specifics of the proposed plan was extracted from the comment summary.

## **2.0 PUBLIC COMMENTS AND RESPONSES**

The public comments, organized by topic, are presented below along with EPA's response. Topics are presented alphabetically as shown in Table 1.

**Table 1. List of Topics for Addressing Public Comment and Section Number**

2.1 Action Levels	2.19 Operable Unit Management
2.2 Adaptive Management	2.20 Proposed Modification of the 2006/2011 Record of Decision
2.3 Air Quality	2.21 Reclamation
2.4 Allocation Agreement	2.22 Regulatory Process
2.5 BPSOU Expansion	2.23 Remedy Effectiveness
2.6 Bull Trout Impacts	2.24 Risk Issues
2.7 Community Involvement	2.25 RMAP Expansion
2.8 Condemnation of Private Property	2.26 Silver Bow Creek Legal Status
2.9 Controlled Groundwater Area Boundary	2.27 Silver Bow Creek above the Confluence Channel Replacement
2.10 Cost in Remedial Decision-Making	2.28 Stormwater Issues
2.11 Economic Development	2.29 Stormwater Retention/Detention Basins
2.12 End Land Use Plan and the Consent Decree	2.30 Source Erosion to Surface Water
2.13 Environmental Justice	2.31 Subdrain
2.14 Flooding	2.32 Surface Water Management Plan
2.15 Funding	2.33 Technical Text and Figure Changes for the 2020 Record of Decision Amendment



2.16 Groundwater	2.34 TI Waiver
2.17 Health Studies	2.35 Waste Removal
2.18 Impacts to Butte-Silver Bow Compliance	2.36 Water Quality District

## 2.1 Action Levels

### 2.1.1 Comment Summary

Ten comments were received regarding the action level for lead in Butte soils of 1,200 parts per million (ppm). Commenters thought it was too high—higher than the action levels for lead in other parts of the country and for the Anaconda Smelter Site—and that it impacted human health and economic development in Butte.

- Comment 7.14.** “18. Lead Level Allowed in Butte is much too high at 1200 ppm. The rest of the nation, and even in Anaconda the standard is 400 ppm. Environmental Justice demands you reduce the standard on the Butte Hill. Why is 1200 ppm “good enough for Butte? Moreover, the latest Health Risk data sheet from EPA regarding Lead Risk does not mention immune-compromised people, the elderly, nursing and pregnant women. The genetic makeup of people who may be harmed by Lead when others are not is just as important to Butte as it is to the rest of the nation. Getting loans for new housing in Butte is also at a great disadvantage when EPA allows more Lead than the Federal Housing Agencies do. EPA must lower the allowed Lead in Butte to 400 ppm and require cleanup accordingly.”
- Comment 13.3.** “The recent lead action level established in Anaconda in 2013, after a decade of requests by the community, set 400 ppm as the correct action level. This clears Anaconda for full-on development activities in regard to housing. An identical level should be chosen for residential areas, including inside houses, for remediation efforts in the residential areas in Butte. If the 400-ppm level can be allowed for residential areas of the BPSOU, it will be possible for Butte to engage in the clean up without reservation or concern, as the residential levels will meet requirements for maximum HUD lead levels. However, if the action level remains at 1200 ppm for lead, which is 800 ppm higher than HUD maximums, Butte’s cleanup will always be in doubt, and consumers and residents will continue to have concerns about the safety of Butte’s residential areas for families with children. Also, this reduction would recognize the need to protect human health, by



avoiding the unknowns of the pollutant mix regularly sampled in Butte residences, given evidence that these pollutants may act in synergistic fashion to provide additional health threats.”

- **Comment 56.5** “And, finally, we probably need to take another look at the protectiveness of the action levels, are they really still protective of human health and the environment.”
- **Comment 57.2.** “We are concerned that the action level for residential areas will do several really harmful things to Butte. The first one is this process has been going on so long that confidence in the cleanup has been deeply shaken over time. And so you're up against -- you have this incredible accomplishment. So many people here have accomplished so much for this community through this cleanup. It's just been almost miraculous. But all of that amazing work is going to go to waste if there's no trust in your final number, there's no trust in your action level as far as lead level for children. If you leave a lead level of 1,200 parts per million, which is three times the HUD maximum for housing that has children in it, you are dooming the town to have no confidence for newcomers coming, and this kind of thing, because why can't you even meet basic HUD standards.”
- **Comment 68.1.** “I agree completely with Barbara Miller about the lead action levels. We should not be the worst place in the nation for lead, in terms of the levels that we're willing to accept. Our action level is going to be a lot worse than Anaconda's, for God's sake.”
- **Comment 74.9.** “9. Lead attainment levels. Having Butte’s attainment level at 1200 ppm instead of the national level of 400 ppm (which is what they have in Anaconda) treats Butte people as second class citizens. In addition, allowing levels greatly above the level required by federal housing agencies can have a detrimental effect on the marketability of housing in Butte. We here in Butte have enough obstacles to adequate economic growth without having a federal environmental agency allowing a standard that under cuts our ability to fully utilize programs of other federal agencies that make financing housing affordable.”
- **Comment 75.1.** “I am writing to request that the levels of lead allowed in the soil in Butte Montana be reduced. As someone who grew up in Butte, I would like the future of Butte available for the



following generations. Also, the continued cleanup of Silver Bow Creek is needed to again provide a future for Butte.”

- **Comment 81.1.** “Today, CLEJ is still campaigning for the kids of Butte. Its Chair, Mary Kay Craig is absolutely correct in pointing to the abysmal lead levels allowed in Butte’s soils. She is right to say that this community’s lead soil levels are much higher than the levels required in other EPA projects. So, I support her drive to finally get a realistic and environmentally just lower lead level for Butte.”
- **Comment 82.3.** “In addition, it is my understanding that the amount of lead allowed in the soils in Butte is way too high, far more than the rest of the USA, even higher than the levels allowed in Anaconda. Therefore, Butte lead standards should be reduced so Butte is on a level playing field with other mine waste impacted communities.”
- **Comment 91.11.** “7. Why were the lead levels in Butte, which are significantly above those of any other Montana city, not reviewed during this proposed update to the ROD. Is this high threshold really necessary? Why are these high levels considered protective of human health in Butte, but not in other mining communities?”

### 2.1.2 EPA Response

The combination of the RMAP and the comparatively low bioavailability of lead within BPSOU support the use of a 1,200 milligram per kilogram (mg/kg) lead cleanup level as a protective remedy.

The soil lead level of 400 mg/kg is a screening level developed by EPA to identify properties where additional investigation may be necessary as part of a risk assessment. This screening level is based on default exposure lead bioavailability assumptions. Bioavailability describes the amount of chemical that is actually absorbed into the body when an exposure medium, such as soil, is ingested. EPA’s default bioavailability assumption is that 60% of the lead in area soil would be bioavailable if ingested. However, actual bioavailability can be highly variable and depends upon site-specific factors, such as the form of lead that is present and environmental conditions in the soil.

Because of this, EPA’s risk assessment guidance recommends performing site-specific bioavailability studies. The BPSOU is unique in that EPA has performed multiple studies, including both laboratory studies and animal studies, to evaluate the site-specific bioavailability of lead in soil.



These studies, which are described in more detail in the 2006/2011 BPSOU Record of Decision, show that soil lead bioavailability in Butte is about 3 times lower than the default assumption. Because lead in Butte soils is less biologically available (coupled with the effectiveness of the RMAP) the site-specific soil lead action level for Butte can be set about three times higher than the default lead screening level of 400 mg/kg and can be as protective as the default level at generic sites. The reason EPA has adopted the default soil lead screening level of 400 mg/kg at other Superfund sites is that those sites do not have the benefit of site-specific information on bioavailability to deviate from the default assumption.

U.S. Department of Housing and Urban Development (HUD) guidelines also adopted the default soil lead screening level of 400 mg/kg as one of its soil lead hazard levels. However, HUD guidelines identify different soil lead hazard levels depending upon the soil location. HUD identifies a level of 400 mg/kg specifically for application to bare soils in play areas and a level of 1,200 mg/kg for application to bare soils in the rest of the yard (40 CFR § 745.65(c)). Thus, the yard-wide HUD level is consistent with the soil lead action level selected for Butte.

EPA will work directly with HUD and other stakeholders to verify that loans or other forms of assistance in Butte are not hindered by the lead action level in Butte. If there are specific incidences where such assistance is hindered, residents should contact Butte Silver Bow County government and the EPA remedial project manager for assistance in solving the problem. Medical monitoring studies find that rates of elevated blood lead levels in Butte children have declined dramatically over the study period. While we surmise that the RMAP has contributed to these declines, we cannot verify or quantify the magnitude of impact.

The BPSOU residential lead action level is based on EPA's human health risk assessment and specifically on the Integrated Exposure Uptake Biokinetic Model (referred to as the IEUBK Model) exercise, which was part of the risk assessment. See the 2006 BPSOU Record of Decision at Part 2, Section 7 for a detailed explanation of EPA's human health risk assessment efforts for the BPSOU. EPA has reviewed this action level several times since the original record of decision and continues to believe that the IEUBK Model was correctly implemented. The model used site-specific data and indicated a lower bioavailability for lead in Butte. Additional protections for human health through the RMAP plan have been implemented in Butte and Walkerville. The lower bioavailability of lead, combined with a robust RMAP plan, supports the conclusion that a



1,200 ppm action level is fully protective of human health in Butte and Walkerville. The RMAP plan, which implements the program to meet the action level for lead as well as action levels for arsenic and mercury, is a unique plan that addresses not only lead in soils or indoor dust from mining sources but also other lead sources in a given residential area, such as lead paint or lead in water pipes. According to blood lead level data collected by the Butte Silver Bow County Health Department, there are dramatically lowered blood lead levels in children in Butte. EPA also requires a medical monitoring study to be conducted by the settling defendants every 5 years to systematically review human health biomonitoring data from Butte and Walkerville to verify that human health is protected from unacceptable risks at the BPSOU.

The soil lead action level is only one component of the RMAP for Butte. Medical monitoring and community education are also important components of the RMAP and allow the program to address the various sources of contamination that may be hazardous to human health, including lead from site sources and from non-site sources, such as lead plumbing and lead-based paint. The results of the 2014 Butte-Silver Bow health study demonstrate this multicomponent program and other factors have been effective in dramatically reducing blood lead levels in Butte children. Indeed, the 2014 health study showed blood lead levels in Butte are now comparable to reference levels nationwide. The positive results of the health study also support the conclusion that no changes to the soil lead action level are necessary. The Butte Silver Bow Health Department is in the process of summarizing the health study data collected since 2013, and a new health study report is expected to be released later this year. EPA will review the information in this health study to inform decisions on whether modifications are needed for the RMAP in the future.

The 2020 Record of Decision Amendment expands the RMAP plan to areas outside of Butte but within Silver Bow County if residents in those areas request it. EPA will implement the RMAP expansion by unilateral administrative order similar to the current RMAP action. This will further protect human health in the area.

If EPA determines in the future that soil action levels for arsenic, lead, or mercury must be lowered, based on information it receives from the future health studies or other sources, EPA's enforcement mechanisms for implementing remedial actions allow for EPA to take additional action under a unilateral administrative order or a consent decree to lower action



levels and require that further cleanup actions are taken to protect human health. See Section 122(f)(6) of CERCLA, 42 U.S. Code [U.S.C.] § 9622(f)(6).

## **2.2 Adaptive Management**

### **2.2.1 Comment Summary**

One comment was received encouraging the use of adaptive management while implementing the future cleanup actions required by the amended Record of Decision. The commenter requests a “reopener clause” in the proposed consent decree to allow modifications to be made in the future.

- **Comment 12.2.** ‘I see no mention of adaptive management in the proposed plan. What happens if some aspect of the plan is not working or if significant changes in the future affect the planned remediation? The proposed plan confidently states that the “modified remedy will achieve the remedial action objectives established for the BPSOU” (at pg 19). While I agree that the objectives are proper, there is no guarantee that the objectives will be achieved. Adaptive management is the on-going process of evaluating whether objectives have been met and adjusting management and treatment strategies in response. The proposal at hand does a poor job of outlining the needs for adaptive management and course correction, particularly where current scientific understanding of the contamination is limited or absent. In the absence of an adaptive management plan, the consent decree should include a reopener clause. The clause would allow the agreement to be modified in the future and allow the EPA to require or release additional funds to address any contaminants that were not manifest or could not reasonably have been documented scientifically from any information in the possession of or reasonably available to the EPA or any PRP on the effective date of this amendment or any contaminants documented before the effective date that persist or worsen, preventing a full recovery.’

### **2.2.2 EPA Response**

The CERCLA statute requires any CERCLA consent decree to include reopeners if new information or new conditions are discovered at a Superfund site. The proposed BPSOU consent decree includes these reopeners. Additionally, the proposed consent decree allows EPA, in consultation with Montana DEQ, to take certain additional work, as outlined in Section 1.3 of the proposed scope of work and Section IX of the consent decree, should the work required under the proposed consent



decree not result in the expected result. Any BPSOU consent decree also will provide for these reserved rights. If the expanded remedy work required under the record of decision amendment is implemented pursuant to a unilateral administrative order, EPA reserves all of its rights to require any kind of additional work authorized under CERCLA to achieve ARAR compliance and the protection of human health and the environment.

In addition, current EPA policy encourages adaptive management when EPA is overseeing or performing remedial design and remedial action. EPA's remedial project manager for the BPSOU site will use adaptive management techniques to verify the efficient and effective implementation of the final BPSOU remedy.

## 2.3 Air Quality

### 2.3.1 Comment Summary

Three comments were received regarding the need for additional air quality monitoring.

- **Comment 21.2.** "It is the position of GNCDC, Inc. that the amended BPSOU ROD should include provisions for ongoing monitoring in the BPSOU area of PM-10 and TSP, accompanied by speciation for ALL the heavy metal contaminants and arsenic considered to be hazardous to human health. Otherwise, an exposure route for toxicity will be completely ignored, and there will be no control of re-contamination to the remediated site. We have been told that the Greely Area Plan area will be considered for inclusion in the West Side Soils Operable Unit (WSSOU). This would serve to correct the error of failing to include the flood plain in the Greely Neighborhood area as part of BPSOU. Again, ongoing monitoring for PM-10 and TSP with speciation in the BPSOU area should be a part of that BPSOU ROD if human health and the prevention of re-contamination of the BPSOU area is really a concern.

"Monitoring. To prevent the exposure to airborne metals, determined to be hazardous to human health by the American Medical Association from impacting human health in the Butte Silver Bow City-County area, with funds provided by the Responsible Parties, (Portion of funding to be as determined by agreement to degree of contaminant contribution from historic mining, active mining and natural surface geology.), Butte-Silver Bow (B-SB), with guidance from EPA and Montana Department of Environmental Quality (DEQ)



will perform the following ongoing monitoring of Airborne Metal Laden Dust every year during the months of: April, May, June, July, August, September with monitoring equipment located at the Greeley Monitoring Station and at least one location in each of the B-SB Council of Commissioner Districts within and outside the EPA's BPSOU. Air quality monitoring to be as follows: PM2.5 for particulate, PM10 for particulate, TSP for particulate, TSP and PM10 speciation, and speciation study of TSP and PM10 for heavy metals

“Control. Appropriate obtainable Local PMIO and TSP Airborne Metals Standard will be established. When monitoring detects excessive airborne contamination in any area appropriate mitigation and/or remediation actions will be taken to prevent further human health risks and/or contamination of previously remediated and/or restored sites in the BP SOU area.”

- **Comment 60.2.** “So what we would ask for is that during --there's supposed to be, like, a nine to 12-year shakedown period for the proposed remedy -- that additional air quality monitoring also be conducted that looks at both the total suspended particulate and PM-10 and that speciates the metal concentration for that expanded list of anolytes just to quantify that, you know, the remedy is working and it's leaving Butte with a diminished long-term health risk.”
- **Comment 96.9.** “May 20, 2019 Attn: Butte-Silver Bow Chief Executive Officer Butte-Silver Bow Council Of Commissioners, and Members There Of Butte-Silver Bow Superfund Coordinator and Members B-SB Superfund Division, 155 West Granite Street, Butte, Montana 59701 Ref: Proposed Amendment to the U.S. Environmental Protection Agency's (EPA) Butte Priority Soils Operable Unit (BPSOU) 2006/2011 Record of Decision Sub: Request for this Butte-Silver Bow City-County Government to submit a letter requesting an Airborne Dust Monitoring and Control Program Amendment be added to the EPA’s Proposed Plan to Amend the 2006/2011 Record of Decision

“In That: Neither the current EPA Butte Priority Soils Operable Unit 2006/2011 Record of Decision nor the EPA’s Proposed Plan to Amend the BPSOU 2006/2011 Record of Decision contain a provision for an ongoing Airborne Dust Monitoring and Control Program that would ensure that the proper clean up of the BPSOU site has been completed to protect human health, and to ensure that proper



monitoring and control of airborne dust is carried out so that the citizens of Butte and the outside world will be assured, beyond a reasonable doubt, that the BPSOU Superfund site has been properly remediated and restored and not re-contaminated, and that Butte is a healthy place in which to live and work. Therefore: On behalf of the GNCDC Inc., I hereby request that this Butte-Silver Bow City-County Government draft a letter and submit it to the EPA, before the June 11, 2019 Comment deadline, requesting that an Airborne Dust Monitoring and Control Program Amendment be added to the EPA's Proposed Plan to Amend the 2006/2011 Record of Decision, and authorize the B-SB Chief Executive and B-SB Council Chairman to sign said letter for and on behalf of the Butte-Silver Bow City-County Government. Respectfully submitted for your consideration and action, For And On Behalf Of The Greeley Neighborhood Community Development Corporation, Inc. R. Edward Banderob, President  
 Attached: - GNCDCInc. - Comment - Proposed Plan to Amend the 2006/2011 Record of Decision - Proposed Amendment to the Document - Monitoring and Control of Airborne Metal Laden Hazardous To Human Health Dust. Ref: Proposed Plan to Amend the 2006/2011 Record of Decision U.S. Environmental Protection Agency's (EPA) Butte Priority Soils Operable Unit.

“Sub: Proposed Amendment to the Document

## Monitoring and Control of Airborne Metal Laden, Hazardous To Human Health, Dust

##.1 Monitoring

To prevent the exposure to airborne metals, determined to be hazardous to human health by the American Medical Association from impacting human health in the Butte Silver Bow City-County area, with funds provided by the Responsible Parties, (Portion of funding to be as determined by agreement to degree of contaminant contribution from historic mining, active mining and natural surface geology.), Butte-Silver Bow (B-SB), with guidance from EPA and Montana Department of Environmental Quality (DEQ) will perform the following ongoing monitoring of Airborne Metal Laden Dust every year during the months of; April, May, June, July, August, September with monitoring equipment located at the Greeley Monitoring Station and at least one location in each of the B-SB Council of Commissioner Districts within and outside the EPA's BPSOU.



“Air quality monitoring to be as follows: PM<sub>2.5</sub> for particulate, PM<sub>10</sub> for particulate, TSP for particulate, TSP and PM<sub>10</sub> speciation, Speciation study of TSP and PM<sub>10</sub> for heavy metals.

“##.2 Control

Appropriate obtainable Local PM<sub>10</sub> and TSP Airborne Metals Standard will be established. When monitoring detects excessive airborne contamination in any area appropriate mitigation and/or remediation actions will be taken to prevent further human health risks and/or contamination of previously remediated and/or restored sites in the BPSOU area.”

### **2.3.2 EPA Response**

The Butte-Silver Bow County Health Department and Montana DEQ Air Quality Division have an ongoing air quality monitoring program for the Butte-Silver Bow Air Quality District. Particulate monitoring is conducted at the air quality station located next to the Greeley School and includes:

- Continuous monitoring for PM 2.5 particulate concentrations using a Met One model 1020 Beta Attenuation Monitor (BAM-1020).
- Continuous monitoring for PM 10 particulate concentrations using a Met One model 1020 Beta Attenuation Monitor (BAM-1020).
- Episodic monitoring for PM 2.5 using three filter-based particulate samplers (BGI Model PQ-200, Met One SASS sampler, URG sampler). These samplers collect particulate matter on filters over 24-hour periods. The filters are then analyzed gravimetrically to determine the average airborne PM<sub>2.5</sub> concentration during the sample period. The filters are analyzed by a laboratory for selected contaminants of concern. The episodic sampling is performed every 6 days, concurrent with EPA’s guidance.
- The air station includes a meteorological tower that measures wind speed, wind direction, and temperature.

The filters from the SASS and URG samplers are regularly analyzed for concentrations of arsenic, cadmium, copper, lead, and zinc. In addition to the metal concentrations analyses, chemical speciation analyses will be completed from November 1, 2019 through February 28, 2020. Speciation analysis data will be used to conduct chemical mass balance modeling.



Additional air quality monitoring in Butte is being conducted by Montana Resources, LLP, which has contracted with Bison Engineering to conduct an ambient air quality study. The study consists of collecting and analyzing total suspended particulate and PM 10. Bison engineering is performing the following monitoring:

- Episodic monitoring for PM10 using a second BGI PQ-200 sampler. The samplers will collect a 24-hour filter sample every 6 days on the EPA national one in 6-day sampling schedule. The sampler's particulate filters will be chemically analyzed for metal concentrations of arsenic, cadmium, copper, lead, and zinc.
- Total suspended particulate monitoring is being completed using a Met One E-Sampler continuous monitor that provides hourly concentration data. The particulate filter will be analyzed for metal concentrations of arsenic, cadmium, copper, lead, and zinc.

Montana Resources, LLP's ambient air quality study started March 4, 2019 and will be completed in an estimated 1 year. The location of the monitors is on top of the Greeley School air monitoring station.

Montana Resources, LLP has agreed to use the data generated by the monitoring program in the following ways:

- To provide data upon which the Montana DEQ and Butte-Silver Bow can base environmental decisions with respect to concerns expressed by Greeley School area residents
- To produce monthly and quarterly data summaries
- To provide data to requesting organizations or agencies

The additional data from the Montana Resources, LLP monitoring program, along with the data from the ongoing Montana DEQ monitoring program, will provide Montana DEQ and Butte-Silver Bow Health Department information to complete a comprehensive assessment of the air quality in the Butte-Silver Bow Air Quality District.

## **2.4 Allocation Agreement**

### **2.4.1 Comment Summary**

One comment was received regarding the allocation agreement.

- **Comment 96.10.** “7) Amendments to the Allocation Agreement. Although not directly related to the Proposed Plan, Butte-Silver Bow



will note for the record in these comments that amendments to the Allocation Agreement with Atlantic Richfield Co. will be necessary. To that end, Atlantic Richfield and Butte-Silver Bow have agreed to negotiate the Allocation Agreement after the consent decree is lodged. The additional work and projects outlined in the Proposed Plan are extensive and will have a direct impact on current operation and maintenance obligations, the RMAP program, and institutional control management obligations. Amendments to the Allocation Agreement will ensure that all costs associated with current and future obligations are covered, and no taxpayer/ratepayer funds are used to meet these obligations.”

#### **2.4.2 EPA Response**

The comment is noted, and EPA encourages Butte Silver Bow County to verify that adequate funding is provided to the county for implementation of portions of the BPSOU remedy.

### **2.5 BPSOU Expansion**

#### **2.5.1 Comment Summary**

Two comments were received regarding BPSOU surface boundary, how it relates to the Greeley neighborhood, and the impacts of the nearby Montana Resources, LLP active mine on this community and elsewhere in Butte.

- **Comment 21.1.** “The Greeley Neighborhood Community Development Corporation, Inc. (GNCDC, Inc.) is a citizen’s community action group made up of residents who live in the Greeley Area Plan residential area immediately south of the active mine site operated by Montana Resources, LLC. The BPSOU boundary abuts the western boundary of the GNCDC, Inc. active area. Ironically, the BPSOU remedy is affected by stormwater originating from the Greeley area. Even though the neighborhood is in the Silver Bow Creek flood plain area, it is not included as a part of the BPSOU. The Greeley Neighborhood is impacted by the current mining operation. For over a decade, the residents of the Greeley Neighborhood have tried to raise the attention of the regulatory agencies to the dust problem in the area. Finally, the residents took samples themselves of the piles of gray dust and had them analyzed. The bore a striking resemblance to the ore being mined across the street. But the Greeley Neighborhood isn’t the only place where metal-laden dust has been found. A recent investigation found arsenic and metals in dust 2 miles



south of the Greeley area (ref). This study also presented evidence that Butte residents within and outside the BPSOU area showed biochemical responses to chronic metal exposure. There are over two square miles of barren mine waste directly north of the Berkeley Pit. This area also includes the Mine Waste Repository, the site where contaminated solids in the BPSOU are repositied to prevent exposure (EPA, 2006). However, this area is not capped and is liable to be entrained as dust and distributed over the valley, exposing the residents to contamination from metals, and re-contaminating remediated BPSOU sites.”

- **Comment 44.1** “I’ve got a simple comment to make. It’s probably 30 years late. At one of your previous presentations, you indicated that the Priority Soils covered the floodplain of Silver Bow Creek. When I looked at a map that showed the floodplain of Silver Bow Creek, it included an area east of Texas Avenue. Therefore, my comment is we need to redraw the line on Priority Soils.”

### 2.5.2 EPA Response

Water quality and the associated remedy in the BPSOU is affected by input from all areas upgradient of Blacktail Creek and Silver Bow Creek from its confluence with Blacktail Creek, including the Greeley Neighborhood. Understanding the upstream impacts and their effect on water quality is a critical piece of information needed to evaluate remedial options for surface water within BPSOU. EPA used data from these upgradient areas to evaluate and develop the final remedial components for the BPSOU, which are reflected in the expanded remedy described in the 2020 BPSOU Record of Decision Amendment.

The question of dust generation from the Montana Resources active mine and from historical mine waste sources and/or the BPSOU mining waste repository and its possible impacts on the Greeley Neighborhood and all of Butte and the surrounding area is an important one. Dust generation is not solely a Superfund issue because, as noted, the Greeley Neighborhood is impacted by the current mining operation across the Continental Drive and the Superfund program does not regulate the active mine (Montana DEQ’s Hard Rock Mining Bureau regulates the active mine through a state permit issued by Montana DEQ). Air sampling has been and is being performed in Butte (see Section 2.3 Air Quality), and a new, more expansive study to consider dust generation from active mine operations and the barren ground around the Berkeley Pit is being implemented as



described in Section 2.3. EPA and Montana DEQ are working cooperatively on this study.

The BPSOU boundary was originally drawn to encompass historical mining operations that impacted soils, groundwater, and surface water on the Butte Hill and in the Timber Butte area based on data EPA collected in the mid-1980s. It was not drawn to encompass the complete floodplain of Silver Bow Creek. The floodplain referenced in the presentation, to which the commenter refers, did not coincide with the BPSOU boundary.

EPA has begun the remedial investigation for the final operable unit of the Silver Bow Creek/Butte Area site—the West Side Soils Operable Unit. Historical mine waste impacts in the Greeley neighborhood and other areas in and around the BPSOU and the Butte Mine Flooding Operable Unit will be evaluated as part of those efforts. In addition, the expanded RMAP required under the 2020 BPSOU Record of Decision Amendment will provide the opportunity for residential property owners in the Greeley neighborhood and elsewhere in Butte to have those properties evaluated for arsenic, lead, and mercury contamination and remediated if necessary.

## **2.6 Bull Trout Impacts**

### **2.6.1 Comment Summary**

One comment was received regarding the Endangered Species Act and bull trout. The commenter requests that EPA conduct an environmental impact statement pursuant to the National Environmental Policy Act. The commenter alleges that the proposed amendment will affect bull trout and water quality in violation of the Endangered Species Act, the National Environmental Policy Act, the Clean Water Act, and the Administrative Procedures Act. The commenter also states that EPA must consult with the U.S. Fish and Wildlife Service (FWS) regarding the BPSOU cleanup.

- **Comment 28.1.** “Please accept these comments on the Butte Hill cleanup from me on behalf of the Alliance for the Wild Rockies. Please analyze the impact to bull trout critical habitat if they are diverting water from Silver Lake, a lake that feeds a bull trout spawning stream, Warm Springs Creek. Warm Springs Creek is also bull trout critical habitat.
  - How will this impact the quality and quantity of water in Warm Springs. Please formally consult with FWS on the impacts of this project on bull trout and bull trout critical habitat. With climate



change there are changes in peak flows from changes to precipitation patterns. (For example, near Butte there are more rain events in the fall resulting in flooding/peak flows that can scour out beds since bull trout spawn in the fall) How will this impact bull trout? Springs Creek?

- How will this impact temperature in warm springs creek? (Is this an adfluvial population or resident?)
- How will this affect temperature, sediment, native fish, bull trout critical habitat in the Clark Fork River?"

*The commenter then presents a lengthy exert from a newspaper article, which describes the general decline of bull trout in the Clark Fork River area.*

- "Please prepare an EIS that addresses the analytical and scientific issues identified above and formally consult with the U.S. FWS on the impact of the project on bull trout and bull trout critical habitat.
- Please see the attached comments by Christopher A. Frissell, Ph.D on the 2014 Draft Recovery Plan. He said the recovery plan for bull trout for bull trout implies (and in a backhanded way specifies) that the USFWS assumes there is flexibility to make management choices deliberately allowing some core area populations of bull trout to go into decline or extinction, on the expectation others will appear from scratch, or disperse from severely depressed relict populations elsewhere in the Recovery Unit to arise in new locations. However, this Draft Plan, the previous listing and recovery planning record, and the published literature present virtually no evidence to substantiate that new populations of bull trout have established in contemporary times, either at the Core Area scale or the next smaller scale of breeding populations. In this regard bull trout are the biological polar opposite of vagile species like wolves, which are demonstrated to be amenable to reintroduction and are proficient colonizers of new territory at the regional scale. On the other hand, we do have evidence that even small, so- called "relict" bull trout populations can rapidly reestablish migratory life histories or expand extant spawning areas when changing habitat conditions allow it. But we do not know that they can establish new populations in previously



unoccupied streams or watersheds under contemporary prevailing conditions. Hence from a scientific perspective, existing populations of bull trout, no matter how small and farflung, must be viewed as the sole seed sources for future recovery.”

### **2.6.2 EPA Response**

The commenter asserts that the expanded remedy selected in the 2020 BPSOU Record of Decision Amendment requires the diversion of Silver Lake Water into the BPSOU. It does not. Butte Silver Bow County is considering expanded use of its water rights from Silver Lake in Butte by allowing the additional diversion of Silver Lake Water into Butte as part of its municipal functions for Butte and to improve Butte area fisheries. However, this is an independent undertaking by the county to facilitate its end land use planning for areas of Butte and is not required by EPA, the BPSOU remedy, or the Mine Flooding Operable Unit remedy nor would it be caused by the selected action. As EPA has no role with regard to the county’s consideration of a diversion of its Silver Lake water rights, no analysis of the impacts of such a diversion are required of EPA for the record of decision amendment. Any concerns regarding the potential diversion of the county’s Silver Lake water rights on bull trout should be raised with the county.

To address the commenter’s assertions concerning alleged violations of various laws other than CERCLA, it is important to understand CERCLA’s requirements for addressing other environmental laws. Under the CERCLA law provisions governing this issue, EPA must comply only with the substantive standards, requirements, criteria, or limitations promulgated under federal environmental or state environmental or siting laws if those substantive standards, requirements, criteria, or limitations are legally applicable or relevant and appropriate. Such substantive standards, requirements, criteria or limitations are known as ARARs. See section 121(d) of CERCLA, 42 U.S.C. § 9621(d) and 40 CFR §§ 300.405(g) and 300.430(e). Because section 121(e) of CERCLA, 42 U.S.C. § 9621(e) exempts on-site CERCLA actions from permit requirements, only substantive provisions of ARARs must be complied with. See *CERCLA Compliance with Other Laws Manual: Interim Final* (EPA 1988) and *CERCLA Compliance with Other Laws Manual: Part II. Clean Air Act and Other Environmental Statutes and State Requirements* (EPA 1989).



CERCLA also provides for the waiver of ARARs under certain circumstances. See section 121(d)(4) of CERCLA, 42 U.S.C. § 9621(d)(4) and 40 CFR § 300.430(f)(1)(ii)(c).

ARARs for the BPSOU were identified in Appendix A of the 2006/2011 BPSOU Record of Decision. Substantive provisions of the Endangered Species Act and certain applicable or relevant and appropriate provisions of the federal Clean Water Act and the Montana Water Quality Act are identified as ARARs in Appendix A of the 2006 BPSOU Record of Decision. The 2020 BPSOU Record of Decision Amendment complies with the substantive provisions identified under the Endangered Species Act, the Clean Water Act, and the Montana Water Quality Act or appropriately waives those provisions in the case of in-stream Montana Water Quality Act water quality standards because of the technical impracticability from an engineering perspective of complying with those standards. See Section 121(d)(4)(C) of CERCLA, 42 U.S.C. § 9621(d)(4)(C), 40 CFR § 300.430(f)(1)(ii)(c)(3), and Section 4 of the 2020 BPSOU Record of Decision Amendment.

In compliance with Endangered Species Act, EPA developed a biological assessment for the Silver Bow Creek/Butte Area remediation efforts, including the BPSOU remediation, and submitted the assessment to the FWS. The Silver Bow Creek/Butte Area biological assessment, dated January 2018, is in the administrative record for the 2020 BPSOU Record of Decision Amendment. As for the Canada lynx and the grizzly bear, the Silver Bow Creek/Butte Area biological assessment concluded that the ongoing and planned response actions at the Site, including the BPSOU remedial actions addressed in the 2020 BPSOU Record of Decision Amendment, may affect, but are not likely to adversely affect either terrestrial species. It also found that the actions had no effect on any designated critical habitat for the Canada lynx or grizzly bear as no critical habitat has been designated for either species within the Silver Bow Creek/Butte Area site action area.

For bull trout, the Silver Bow Creek/Butte Area biological assessment examined potential effects for all of the ongoing Silver Bow Creek/Butte Area operable unit remediation actions, including the ongoing BPSOU remedial action that includes the potential expanded components contained in the 2020 BPSOU Record of Decision Amendment. For BPSOU, the 2018 Silver Bow Creek/Butte Area biological assessment noted that a fish barrier downstream from the BPSOU in Durant Canyon prevents the migration of bull trout into Silver Bow Creek in and near the



BPSOU. The fish barrier, installed independently from the Superfund remedial program, was funded by the State of Montana's Natural Resource Damage Program at the request of the Montana Department of Fish, Wildlife and Parks to protect pure strains of cutthroat trout in upstream areas of German Gulch. The biological assessment also noted that bull trout are not currently found within Silver Bow Creek and Silver Bow Creek is not within the designated critical habitat for bull trout. Therefore, the expanded remedy described in the 2020 BPSOU Record of Decision Amendment will not adversely affect or otherwise harm bull trout, and no take permit is required under the Endangered Species Act.

The 2018 Silver Bow Creek/Butte Area biological assessment contains analysis on potential effects from the downstream Warm Springs Ponds Operable Unit and its discharge into the Clark Fork River, and FWS has asked for additional information and analysis in a revised Silver Bow Creek/Butte Area biological assessment relative to the Warm Springs Ponds operable units. See the February 3, 2020 EPA memorandum on ESA substantive compliance and EPA's December 17, 2019 email response, which are included in the administrative record for this record of decision amendment. EPA is currently revising the Silver Bow Creek/Butte Area biological assessment in response to those comments, but the revisions will not alter the analysis regarding Endangered Species Act substantive compliance relative to BPSOU ongoing and future response actions.

The substantive provisions of the Clean Water Act and the Montana Water Quality Act are complied with in accordance with the CERCLA provisions cited above. A point source discharge into Silver Bow Creek from the Butte Treatment Lagoons, which treat contaminated groundwater prior to discharge, must comply with applicable, end-of-pipe discharge standards promulgated under the Montana Water Quality Act and otherwise comply with substantive Clean Water Act and Montana Water Quality Act ARARs identified in the 2006/2011 BPSOU Record of Decision, Attachment A. Stormwater controls required under the BPSOU ROD are consistent with and in compliance with substantive Montana Water Quality Act requirements for stormwater controls for urban areas promulgated by Montana DEQ and identified in the 2006/2011 BPSOU Record of Decision. The extensive cleanup actions described in the BPSOU ROD are expected to result in compliance with in-stream Montana Water Quality Act chronic and acute standards except for in-stream acute standards for copper and zinc. These standards are



appropriately waived pursuant to Section 121(d)(4)(C) of CERCLA, 42 U.S.C. § 9621(d)(4)(C) and 40 CFR § 300.430(f)(1)(ii)(c)(3) as technically impracticable.

An environmental impact statement under National Environmental Policy Act is not required for CERCLA response decision documents as the CERCLA response action selection process is the functional equivalent of the National Environmental Policy Act process and permits are not required for CERCLA actions pursuant to section 121(e) of CERCLA, 42 U.S.C. § 9621(e). See Oil, Chem. & Atomic Workers Int'l Union v. U.S. Dep't of Energy, 62 F. Supp. 2d 1, 5 (D.D.C. 1999), *aff'd*, 214 F.3d 1379 (D.C. Cir. 2000), Schalk v. Reilly, 900 F.2d 1091 (7th Cir. 1990) and Ala. ex rel Siegelman v. EPA, 911 F.2d 499, 505 (11th Cir. 1990) (all holding that a CERCLA response decision could not be challenged under National Environmental Policy Act both for functional equivalency reasons and because CERCLA section 113(h) prevented such challenges at the time a response decision is made).

The commenter states that EPA did not comply with the Administrative Procedures Act in the issuance of the 2020 BPSOU Record of Decision Amendment. However, the commenter does not explain how this alleged noncompliance occurred. EPA believes it is in compliance with any applicable portion of the Administrative Procedures Act for the 2020 BPSOU Record of Decision Amendment because notice of the availability of the proposed plan was made on EPA's Silver Bow Creek/Butte Area website and in a major newspaper of general circulation, the public was given a 90-day comment period to comment on the proposed plan, oral comments taken at two hearings conducted for the proposed plan were transcribed, and all significant comments are responded to in this responsiveness summary attached to the 2020 BPSOU Record of Decision Amendment in accordance with CERCLA and 40 CFR § 300.430(f)(3)(1).

The response to the commenter's assertion that the BPSOU remedy should comply with state water quality standards is addressed in the response to comments found in Section 2.34 of this responsiveness summary. EPA acknowledges the commenter's inclusion of a comment letter to FWS, which is critical of the FWS recovery plan for bull trout. EPA has no legal authority to alter or change that plan, and any concerns regarding the FWS bull trout recovery plan should be directed to FWS.



## 2.7 Community Involvement

### 2.7.1 Appreciative of Outreach

#### 2.7.1.1 Comment Summary

Three comments were received that expressed appreciation for the community outreach provided by EPA at the BPSOU.

- **Comment 8.1.** “I attended the first public hearing in the current BPSOU public comment cycle but decided not to attend the second one; instead, I’ve spent my time composing some comments for the record regarding the proposed plan. Superfund’s decision criteria refer to these opportunities for public input as “modifying criteria” that presumably help EPA and its negotiating partners to gain “community acceptance” for their proposed plans. Yet after more than 30 years of these EPA-sponsored events, many in the community have become numb to the significance of the pending decisions, or angry about the outcomes. With few exceptions, these public hearings strike me more as opportunities for individuals to grandstand than for offering insights that are likely to be used to modify the proposed plan. For those who do show up, some make broad based statements of approval or condemnation, while others make specific “modifying” recommendations, in the spirit of the nature of the specific Superfund criteria afforded to these events. Our comments, criticism, and praise, all only have the power--at best--to persuade the negotiating parties to “modify” their proposed plan to help ensure community acceptance. Comments that recommend that the parties throw out their entire plan and start over simply don’t fit the nature of this forum; such commenters may passionately believe what they say, but the occasion asks us for ideas about “modifying” the plan as proposed, not rejecting it entirely. My first comment is a hope that these mandated public comment events could be designed to more effectively gauge the full range of community knowledge and concern about the issue at hand. As it is, they come across as more perfunctory ceremonial affairs rather than honest efforts to engage the wider community in the process. For my part in the following comment, I will commend the plan for some of its specific features that hold much promise for fulfilling Superfund’s mandate and Butte’s hopes for a Superfund-free future; but I will also suggest some shortcomings in the plan that I hope can be “modified” as it is finalized and codified in a new ROD and eventually in the consent decree among the negotiating parties.



- The most significant positive feature of the current plan is the process that gave birth to it. In more than 30 years of observing and participating in these Superfund decision processes for operable units from the Berkeley Pit to the Warm Springs Ponds, I've never seen such robust engagement with different elements of the community, nor have I ever seen the community's clear wishes have such a profound effect on major modifications to the ROD. EPA staff as well as the others at the negotiating table (DEQ, BP/AR, BSB) are to be commended: they have listened to us.
  - In listening to us, the plan changed from one that would have left wastes in place along Silver Bow Creek, to one that committed to remove all such wastes.
  - In listening to us, the planners came to understand that the cleanup of the Upper Silver Bow Creek corridor had to be developed as an aesthetically pleasing public space—a riparian park.
  - In listening to us, the planners came to acknowledge that the proposed use of the creek corridor as the primary location for treating stormwater runoff from the Butte hill would NOT “preclude the restoration of Silver Bow Creek” as a meandering stream.
  - Public health concerns related to Superfund issues remain confusing and contentious, but the Health Study Working Group that is required every five years to review the protectiveness of various aspects of the remedy has become more open and proactive—again, in large part due to the “modifying” input from concerned members of the community.”
- **Comment 22.12.** “7.1 CTEC is appreciative of both EPA and ARCO’s increased attention to involving the Butte community in Superfund decisions. The community listening sessions, involvement by national and regional EPA administrators, and coordination of the Proposed Plan with community amenities proposed in the consent decree Remedial Elements is a new level of community involvement in Superfund decision planning. This is a significant improvement over the level of community involvement in the 2006 Record of Decision and we believe will lead to greater community acceptance of the remedy.”



- **Comment 25.2.** “Trout Unlimited appreciates EPA’s increased community engagement emphasis in developing this plan and the opportunity to comment on it. TU supports continued community engagement in finalizing the Consent Decree negotiations and implementation of the Proposed Plan and offers the following additional comments: [addressed by topic in the document].”

#### **2.7.1.2 EPA Response**

The positive comments regarding EPA’s community outreach at the BPSOU are appreciated and noted for the record.

### **2.7.2 Other**

#### **2.7.2.1 Comment Summary**

Twelve comments were received that raised issues or made requests regarding community involvement at the BPSOU. Issues included a perception that EPA did not heed public comment or that meetings were not well advertised. There were concerns that the comment review and response process was moving too quickly and a request was made for public opportunity to review the draft responsiveness summary report. There was a request for public education on protecting health and on effectiveness of remediation. Finally, there was a request that the 2020 BPSOU Record of Decision Amendment will include language to ensure the final design plans and drawings are made available for public review and that EPA consider the input of the Greeley Neighborhood Development Corporation and of Habitat for Humanity.

- **Comment 2.10b.** “Sadly, every ingredient that was necessary to implement a responsible cleanup for the Butte Priority Soils Superfund Area has been articulated many times over to the EPA by myself and other concerned citizens over the past several years. For whatever reason, the EPA has totally ignored this input. Public input means nothing to the EPA! They only have public meetings to satisfy the legal requirement of having the meetings.”
- **Comment 20.3.** “I would also request that, in the interest of reaching the very best solution that everyone can accept and understand, the comment period be extended to allow the public comment engine to reach full steam before being shut down. There is plenty left to be said by the citizens. Two public comment meetings is simply not enough.”
- **Comment 27.1** “All; Good day hope all is well. I am very happy to see Mr. Wardell has extended the public comment period to July 11,



2019. I think this makes sense with many other issues coming forward at this time. The Supreme Court wishing to hear the residents of Opportunity, (our neighbors) case and concerns. The treatment plant discussion in progress. There are other interests that can be addressed. Many of us still want our Creek and there may be further litigation on that issue. Thank you, Mr. Wardell for allowing Butte people to think a bit more about short term solutions to long term issues.”

- **Comment 34.1** “Thank you for extending the comment period. In many ways, the proposed changes are positive. I have two comments [Addressed by topic elsewhere in the document].”
- **Comment 51.1.** “I’m a native Butte person. And I’m looking around the room here, and I know almost everyone here. But most of the reason that I know everyone here is that most of the people here have involved themselves in Superfund in some way or another. So many of you are people who are stakeholders. And then there are others who are involved in volunteer Superfund groups. And it’s lovely to see people who have not been involved coming forward to speak. My concern is that most of the people aren’t here. Now, if I was going to put on a meeting I know how I’d do it. I’d make an awful lot of phone calls. I’d put out some literature. I’d make sure that I had every newspaper with an ad for something so big as it is for here in Butte. And I’m pretty disappointed with this turnout. And I’m very disappointed with the people who put it on because they have not made the effort that is required to get the people in Butte involved.”
- **Comment 58.7.** [Follow-on comment from a commenter after everyone had 5 minutes] “Yeah. I want to just share just a couple, just, I know people get tired and are ready to go home. I understand that, as well. But just for clarification, so people know what. I submitted written comments to the EPA, and I wrote a letter that took me a long time to write. It took me a few days to write it. And I had some serious concerns, as you all know from listening to me tonight. I have some serious concerns about what’s going on. And I’m concerned for my community. But what happened in the process is that I received a tan letter back from the EPA to my letter that was a one-page summary that just said, “Thank you very much.” It does not address one single comment that I made or one single question that I addressed, not one. Not one did you guys address, not one. And you gave a copy of an editorial that Doug Benevento had done way back when. And that was your cursory response to my comments. And just so the people know



here, I've been involved in this for a long, long time. And sometimes I say I know too much and I wish I didn't. I wish I didn't know too much about the EPA. I wish I didn't know as much about you guys as I do. But here's what happens with your comments. Here's what happens with your comments that were made tonight. Here's what happens to your comments that you submit in writing. Here's what happens to them. I've been down the road. I've played the game. Here's what happens. Those comments go to the EPA, to these folks up here tonight, not to our community that's responsive. They go to the EPA. And what the EPA does is they submit those comments to the judge. That's what they do. The judge doesn't hear what he needs to hear. I have written Judge Haddon a letter after some legal disputes that we're involved in. And, basically, what Judge Haddon did to me is he sent me back a letter saying, "Don't write to me. Don't write to me. I don't want to know what Fritz Daily has to say. I don't care what he has to say." That's basically what he said."

- **Comment 68.2b.** "Compliments to the EPA for pushing this thing out into the open, for pushing the CD participants with the threat of moving on a UAO so that they had to get to the table and do something. Compliments to the EPA for doing that. You broke the log jam. Now things are moving. And maybe, maybe, a little too fast, I think, August 15 CD, comment period. And I appreciate Doug Benevento saying we're going to get this done by a given date, because that has forced action. But it's pretty scary because some of these things we're looking at right now we're acquiescing to or being asked to acquiesce to. I don't think it's quite been played out adequately yet. So but thank you to the EPA for driving this process forward. I worry that now we're rushing. Thank God we got it started and thank God we've gotten to where we have. Good for you on all that stuff. But we need, for example, the resources dedicated to its conceptual engineering design and feasibility study. We need, I think, to take a serious look, given what the reminders we have from Judge Newman and from Fritz and from the reality from Sister Mary Jo, who made the point quite well, that between Texas Avenue and Montana Street our creek was changed by ARCO. Do we have the right because of that to ask that maybe it be changed back to something a little better than what we're being told right now? I think so."
- **Comment 70.2b.** "You can see there's a lot of concerned citizens here that are fairly well informed. They should really have known what



was going on. Now, one could argue that that was Butte-Silver Bow's job to do that, but -- frankly, because they were one of the principal parties. But they didn't particularly do a good job of informing the public of what was going on. And that should -- that should never have happened. So that's one flaw from the start. I don't know that that necessarily speaks to the ROD strongly right now. But thirty years is a long time, and we haven't had many chances to stand up and comment on what's going on. One, we didn't know what was going on. And now that we do have a better idea of what's going on, we have two meetings on the ROD, and we have a short informal question and answer. And I know there were some people in the audience who looked like they were ready to ask a question informally and didn't get that chance. We moved in a short period of time, before seven o'clock. This meeting started at six. About half of it was taken up by Nikia's comments. So there was maybe less than a half an hour for informal discussion. That's another flaw in the process. And now we're into the formal comment, and we're limited to five minutes. Thirty years, thirty years of pent up concern about this community and really no time to talk about it. Now, we can either go longer or we can have multiple sessions. There are ways around this. But I find it doesn't give me much confidence in the process when it plays out along those lines.

So, the timelines for public comment, all that, are spelled out under federal rulemaking. But what's not spelled out and what's not a requirement is the signed consent decree by mid-August. And I think if you just look at the process, where the end of the comment period will be June 11, to go from realistically incorporating what you're hearing tonight and what you've heard over the last few months, including very important legal distinctions that the State of Montana needs to consider, to go from all that in the course of two months doesn't give me a lot of faith that we're going to be heard. And the comments I wanted to make and what would be wise of you all to consider is that sometimes when you're locked into a room for years and years and years -- and I know this. I have bargained with some of the biggest corporations on earth on behalf of labor. And I know two things. One is those that set the timelines set and control negotiations. And so if you set a hard timeline of August 10 or August 15 that we're going to have this signed you're driving a false timeline on those negotiations. So that's the first thing I know.”



- **Comment 73.1.** “I have an unconventional concern. I'm an herbalist and a food therapist. And that is what I can do in a very small way to take responsibility for my own health living in Butte and my own soil living in Butte. That there might be some research done, made available to the Butte public on plants that we can grow that might be able to be discarded because they're able to uptake and catch heavy metals and clean my own soil. And these might be -- in Anaconda, at the Farmer's Market, I think there was a flyer up that said, "Please, anybody growing vegetables in Anaconda bring them in for heavy metals testing." Any gardener in Butte can have their food tested to see if, in fact, it's uptaking heavy metals. Also, make available to the public any research done on foods that can help eliminate heavy metals from the body. I have a protocol from an herbalist is Hot Springs, Montana, simple foods, cilantro for Mercury, chelators that help eliminate heavy metals from the body. Foods that can be grown here. Apples, onions, garlic, broccoli, kale, collards, brussels sprouts. These things can be done on an individual basis so that citizens can actually take responsibility for the effects of living here. Please consider these things that we can do for ourselves.”
- **Comment 74.8.** “Again, I look forward to your responses to each of these comments. In addition, at a recent meeting with EPA I suggested that EPA produce to the public the written responses to all comments at least 2 weeks before the issuing of the ROD itself. It would be beneficial for the community and the agency to absorb the responses before the ROD is formally submitted in the event that EPA makes a grievous error in its response to comments. The flexibility would be beneficial. Unless the EPA is specifically precluded by law from putting out the response document first, it should do so.”
- **Comment 91.9.** “8. Information on the effectiveness of the clean-up of Silver Bow Creek has not been regularly provided to the public. Will monitoring and dissemination of information improve in the future and how?”
- **Comment 96.2.** “For Butte-Silver Bow, it has been refreshing to participate in eleven-year long collaborative effort to reach consensus. The staff from all parties – the EPA, the State of Montana, Atlantic Richfield, Butte-Silver Bow, and interested citizens through advocacy groups – have worked together to produce a sound, experience- and science-based Proposed Plan for ongoing work and forthcoming projects. The anticipated outcome of this effort is an effective,



sustainable cleanup solution mindful of long-term monitoring and management responsibilities.

“6) Conceptual Plans Translated into Remedial Designs/Implementation. The conceptual plans presented in the Proposed Plan and supporting documents released in May 2018 constitute significant work projects to be completed in the next 5-6 years. Although these conceptual plans are fairly descriptive and explanatory, questions about specific design details have been deferred to the Remedial Design phase that will follow lodging a Consent Decree. For example, final design decisions will be made on tailings and removal depths and quantities, how and where ground water controls will be installed, sediment basin sizes and depths, among others. Butte-Silver Bow would ask for assurance that the final Proposed Plan and CD will include language to ensure the final design plans and drawings are made available for public review.

“8) Public Input/Attachments. Butte-Silver Bow has received public input from individual citizens and advocacy groups related to the Proposed Plan. Attached are documents related to that input, and should be considered as part of the record in Butte-Silver Bow’s comments, as follows: a) Greeley Neighborhood Community Development Corporation Inc. – May 20, 2019, Memorandum Requesting Airborne Dust Monitoring and Control Program Amendment be added to the EPA’s Proposed Plan. b) Habitat for Humanity of Southwest Montana – May 23, 2019, EPA Proposed Plan public comment regarding consistency of action levels between federal agencies such as Environmental Protection Agency and Housing and Urban Development.”

#### **2.7.2.2 EPA Response**

EPA takes public involvement seriously, including the public involvement process associated with a proposed plan for a record of decision amendment. After the proposed plan was released, EPA held two public meetings, 1 month apart, which is twice what is required by CERCLA. The meetings were advertised in advance in the *Butte Weekly* and the *Montana Standard*. Interviews were given to local media about the scope of the proposed plan and reasons why the amendment was necessary. A fact sheet prepared for the proposed plan was mentioned in the advertisements along with the website where the fact sheet and proposed plan could be viewed or downloaded. Copies of the fact sheet



and proposed plan were also distributed at the public meeting. The website, fact sheet, and proposed plan all listed the meeting information. Other stakeholders, like the technical grant recipient for this site, CTEC, also provided information about the proposed plan and the upcoming meeting.

Everyone who wanted to comment had the opportunity to do so. As is often the case at public meetings, there was a per person time limit (5 minutes in this case) to speak, allowing anyone who wanted to do so a chance to speak. After all commenters had their initial 5 minutes, commenters were allowed to continue their thought if they felt the need. Several people did.

In addition to oral comments recorded by the stenographer at the public meetings, those interested in providing public comment could do so in writing via email or standard mail throughout the 90-day period. No constraints were placed on the length or number of comment submissions.

The time allotted for the public comment process varies from site to site, depending on the number of staff assigned and the deadlines provided. EPA initially provided a 60-day public comment period on the proposed plan and then extended that by another 30 days at the request of the public and in compliance with the NCP.

Public comments were compiled, read, categorized, and evaluated by EPA technical and legal staff in Montana to determine if modifications to the proposed plan for record of decision amendment were warranted. They were also reviewed by EPA regional staff and were provided to the Montana DEQ. Not all of the requested changes can or should be made, but that does not mean that the comments are not taken seriously.

Additionally, public communication and coordination started well before the proposed plan was released. For example, in May of 2018, EPA released a remedial elements conceptual scope of work, that was, in part, a fairly detailed narrative description of concepts proposed in the proposed plan for a record of decision amendment. EPA held two public meetings that presented this plan and provided several fact sheets as part of that process to explain specific parts of the Remedial Elements Conceptual Scope of Work. Additionally, many end land use meetings were conducted by EPA, Butte Silver Bow, Montana DEQ, and Atlantic Richfield to provide plans for the end land use of the corridor area, which are connected to some remedial actions required in the record of decision



amendment. These meetings and plans were efforts by EPA, Butte Silver Bow, Montana DEQ, and Atlantic Richfield to address the community vision for end land use developed during the county's visioning sessions in 2018 and 2019. Finally, EPA awarded a grant to CTEC, the Technical Assistance Committee recipient for this site, to evaluate community-desired end land use for the corridor area and its compatibility with the remedial elements in this same area.

EPA will verify that draft design plans and drawings are made available to the public and will commit to a transparent process for the remedial design that will follow the issuance of any enforcement mechanism for implementation of the amended record of decision . The comments offered by the Greeley Neighborhood Community Development Corporation and Habitat for Humanity of Southwest Montana are addressed in this document under other, specific topic areas.

## **2.8 Condemnation of Private Property**

### **2.8.1 Comment Summary**

One commenter stated that the residences and businesses within large areas of the BPSOU should be voluntarily purchased by Atlantic Richfield, and the areas should be excavated and redeveloped, as this would be more cost-effective than cleaning up residential properties at each home. The commenter suggests the Alice Pit could be used as a repository for the excavated material.

- **Comment 53.6.** "I want to speak for my generation and the future of Butte and demand a study to determine the most effective solution to the origin of many of the metals that are contributing to the minerals and metals that are causing both human and aquatic environments to exceed federal and state levels. And that's the area described. It doesn't take much of an engineering degree to suggest that the most cost-effective solution to truly clean up the Butte Hill and prevent surface erosion and exposure to metals and minerals in any form, especially to humans and aquatic species, is to negotiate with all property owners in the area described and acquire property through purchase with eminent domain, completely demolish the area described and use the same material to fill the Alice Pit. Once the area is entirely demolished and all curbs, gutters, sidewalks, streets, buildable lots, parks and playgrounds, the initial stage of the project would be covered at a cost of cleanup and remediation. However, the long-term would provide commercial and residential real estate with new, modern utilities and



infrastructure. This in and of itself could potentially provide funding or reduce the loss of cleanup costs by ARCO, EPA and responsible parties.

“So, just to close, like I said at the last meeting, I think it was the problem with the engineers doing a crappy and lazy job and that created the technical impracticability. And, by that, I mean, they went the easy route. They went, "What's going to be the easiest thing to clean up?" You know, all the areas where no one's living around. The creek beds and the stream beds and the area behind the dam, they didn't interrupt anybody.

“And to reiterate on the park and the playground, like I said, I think it's technically a practical joke and a deceptive ploy to engage the community in a long-term plan. Again, for a project that has an established boundary and an area that will have little to no impact on any home or business or building or real estate. And the real issues and the real problem areas, again, by this map, are areas that are surrounded by real estate, dwellings, homes, buildings. You know, most of which would probably benefit from, rather than an attic cleanup or a yard cleanup –

“You know, I look at the bids for some of these things. You know, this is no joke. I mean, I follow the bid package, and there will be \$17,000 to clean up a yard. And I look at the house, and I'm, like, I wouldn't pay 25,000 for the house and they're giving \$17,000 to clean up the dirt. I mean, where is the intelligence and the business savvy and economic sense? It doesn't make any sense. So, I think it might be worthy of ARCO to look at it from -- again, it's not their responsibility. I'm aware of that. But maybe they will consider, as part of this process, stepping in and acting as a redeveloper or a developer into an area. You know it can be done. The Anaconda Company did it 50, 60, 70 years ago. They bought everybody out and they turned it into the pit. You know, we can buy everybody out and turn it into a great place to live.”

### **2.8.2 EPA Response**

Residential yards have been and will continue to be remediated, using the RMAP plan such that human health is protected. Condemning properties and excavating large areas within Butte would not be cost-effective or necessary. The Alice Pit has been partially filled in and remediated



through capping and revegetation as part of EPA's prior response actions at the BPSOU.

## **2.9 Controlled Groundwater Area Boundary**

### **2.9.1 Comment Summary**

One commenter stated that the Controlled Groundwater Area boundary used by Butte Silver Bow County should be revised to reflect current data.

- **Comment 15.5.** "As a side note, I would strongly consider revising the TI GW boundary to match current GW conditions and also that of the local Controlled Groundwater Area boundary, employed by BSB. This will avoid confusion and inconsistencies when future GW data is collected near the boundary."

### **2.9.2 EPA Response**

EPA is working with the responsible parties to evaluate the existing BPSOU groundwater technical impracticability boundary. Two documents—a technical memorandum titled *BPSOU Point of Compliance Well Evaluation* (Atlantic Richfield 2019a) and EPA response dated October 22, 2019 (EPA 2019c)—have been added to the administrative record supporting the 2020 BPSOU Record of Decision Amendment, and they discuss appropriate points of compliance for monitoring groundwater within the BPSOU.

## **2.10 Cost in Remedial Decision-Making**

### **2.10.1 Comment Summary**

Two commenters asserted that costs should not be considered when EPA and Montana DEQ consider remedial decisions under the Superfund program.

- **Comment 41.6.** "And, you know, it's disturbing to me that what's happening now with the removal of the county shops -- and this should affect the commissioners here tonight. With the removal of the county shops and the removal of the Parrot Tailings, what's happened now is cost has become the main criteria. Now we're determining everything based on cost. When we removed the Milltown Dam, it wasn't based on cost. When we decided to restore Silver Bow Creek and clean Silver Bow Creek from the interstate to Warm Springs Ponds, which, by the way, cost \$151 million to do, and it was only estimated to cost 34 to \$41 million, cost wasn't the item. But now costs that we're in Butte, it's the item. We're doing everything in Butte on the cheap. That's wrong. That's wrong. That's the way it is. It's wrong."



- **Comment 52.4.** “And, finally, quit talking about money. Because look in this room. The value of this room in the people is way more than any money we're talking about. Forget the money number and think about the lives you're affecting and the people whose lives have been lost because the economy of this town has been destroyed for the last 35 years that you've done very little to nothing. Our economy in this community has shrunk because of the lack of your response to the cleanup of this community, be it the State, be it Butte-Silver Bow, the EPA, ARCO. I don't know who's to blame. Is all I'm saying is take a look at how bad our town is. Take a look at the economy of this community that you have failed. Quit talking about money. Let's talk about the lives and the livelihood that are owed to the people that created the wealth for this state in the city of Butte. Thank you.”

#### **2.10.2 EPA Response**

EPA is required to consider costs and whether the selected remedy is cost-effective pursuant to the CERCLA law and its implementing regulations found in the NCP. See 40 CFR § 300.430(e)(9)(iii)(G).

### **2.11 Economic Development**

#### **2.11.1 Comment Summary**

Four comments were received that stressed a need for economic development in Butte and its connection to the Superfund cleanup activities. Site delisting was cited as an important goal.

- **Comment 16.2.** “Finally, there is discussion of economic redevelopment as part of Superfund, yet the redevelopment efforts for Butte have been scattered and lack focus, direction, purpose. Is there a methodology for ensuing revitalization of neighborhoods within this BPSOU boundary? Blight is rampant within the BPSOU and other than cleaning yards and attics and developing parks, there has been very little done to address redevelopment in an economic sense. Perhaps there has been redevelopment work done, but it isn't immediately obvious.”
- **Comment 31.7.** “5. Economic Difficulties. Up to this point in 2019, cleanup activities have wholly focused on locating, testing and removing metals, minerals, carcinogens, and contaminants primarily from Silver Bow Creek, the Clark Fork River and areas on the Butte Hill, Smelter Hill in Anaconda, and Opportunity. There has been no effort to restore the economy of Southwest Montana or identify that



the superfund designation and remaining exposed mining waste have contributed to a negative public perception of Butte by outsiders and those who are considering relocating or growing their business. The cleanup cannot be considered to be complete until there have been efforts with measurable impact to provide opportunities for growth and redevelopment to replace economic possibilities that have been lost since the mines have closed and the waste has been established. IT IS TIME TO PROVIDE PLANS AND OPPORTUNITIES FOR GROWTH AND REDEVELOPMENT OF BUTTE. IF LONG TERM PLANS AND EFFORTS OCCUR ALONGSIDE, OR AS A RESULT OF CLEANUP, THEY NEED TO BE GIVEN PRIORITY CONSIDERATION AND WEIGHT.”

- **Comment 53.5.** “Demanding a restored creek, park and playground is a practical joke and simply putting the cart before the horse. If this town isn't cleaned up and restored, there's not going to be any citizens willing to continue to live here or relocate to use the newly created areas, which would contribute to a loss of tax base that would be necessary to maintain the pie-in-the-sky park area.”
- **Comment 65.9.** “So, I'm going to speak more to the economic development side that you can unanimously see in the community as a concern. But I believe that the finalization of the ROD amendment and Consent Decree are critical parts of the process of delisting us from the Superfund and DL site. Delisting is important to the economic outlook of Butte. If you ask anyone outside of Butte why they won't move to Butte, it has to do with the synonym of Butte and the Superfund site. And I've heard a lot of comments about we've drug this out but then we're asking you to drag it out. And that doesn't make a ton of sense to me. So I'm not sure which stand -- which foot we're standing on as a community, to get it done or to drag it out. But let's see. So, like I said, delisting is important. We should be pressing towards building a local economy that can sustain the inevitable closure of the Montana Resources current mining operations. The reality is we will always be The Mining City but we will not be a mining city within the next three decades due to ore reserves. Removing the synonym of Butte and Superfund is a critical part of a good economic strategy for Butte to grow and to sustain. And, I assure you, all of our economic developers agree with me. They won't speak, though. They can't.”



### 2.11.2 EPA Response

EPA places a high priority on working with communities regarding the reuse of Superfund sites after cleanup occurs. This is as an integral part of the Superfund cleanup program's current focus. Hundreds of communities have reclaimed formerly contaminated Superfund sites for protective and productive uses. In Butte, EPA has worked with local stakeholders, including government and industry, to be mindful of cleanup impacts on current and future land use in the community. EPA's approach has been to work with Butte residents on ideas, coordinate redevelopment with cleanup wherever possible (e.g., the construction of the Copper Mountain Recreation Complex on top of the waste repository located there), and assist the community to evaluate end land use possibilities in areas addressed by Superfund cleanups after the cleanup occurs. EPA has also required the responsible parties to address historic preservation issues and comply with the regional historic preservation plan through mitigation measures when listed or eligible historical resources are affected by the Superfund cleanup (e.g., Atlantic Richfield's financial contributions to the Butte visitor's center). Public and private cooperation makes it possible to transfer properties owned by Atlantic Richfield and mining companies to local government for potential redevelopment.

Additionally, EPA's Brownfields initiative encourages redevelopment of industrial areas that were once blighted by contamination. Since 2001, EPA has worked to obtain Brownfields money specifically for future development of the Butte Area Superfund Site. EPA awarded a \$100,000 grant to Butte-Silver Bow County for geophysical work to determine structural integrity of vacant properties in uptown and central Butte. EPA awarded a \$30,000 grant to develop a film on the history of the Butte area and the role Superfund has played in its redevelopment. Currently, there are ongoing Brownfields projects in Butte.

EPA has also worked to require the creation of the Butte Hill Trail, a walking trail developed from an abandoned railroad bed, as an example of new beneficial use. New public development and use of reclaimed sources areas include Granite Mountain Memorial, the Copper Mountain Recreation Complex, the Missoula Street Complex, and the Knob Hill Park and Trail. Private development in these areas includes the Chamber of Commerce facility, storage units facilities, Aware, Inc., and the Tullamore subdivision. EPA also coordinated with many partners in



facilitating the East Side redevelopment project, which includes Butte Central High School gym and the Belmont Mine Yard.

Several mine yards have also been redeveloped. At the Anselmo Mine Yard, a joint effort between state and local government redeveloped the historical mine yard for the public (tours and other activities). The Kelley Mine Yard was redeveloped into offices for Atlantic Richfield. The Steward Mine Yard is slated for redevelopment by Butte-Silver Bow County. More recently, the Lexington Mine Yard is an area that Butte Silver Bow has transformed into a historical feature for the community. Additionally, the Original Mine Yard is used for public events like concerts and movie night. Montana Tech now uses the Syndicate Pit as a training ground for students of underground mining. Butte Silver Bow has received Resource Indemnity Trust grant funds from the State of Montana to address other important issues on the Butte Hill, including underground subsidence and the restoration of historical head frames.

Recently, EPA worked with community members, Atlantic Richfield, and Butte Silver Bow County to develop an end land use plan for the corridor from the confluence of Silver Bow Creek and Blacktail Creek to Texas Avenue. The end land use addendum with voluntary commitments was released to the public on May 17, 2019 and will be made part of the proposed BPSOU consent decree lodged with the court if approval of that document is obtained. the State of Montana agreed to set aside a portion of the consent decree money it will receive, if a Consent Decree is approved, for used for the design and/or construction of a lined creek in the corridor area, if there are funds left over after implementation of the Blacktail Creek remedial work described in the Consent Decree. Such funds would be used as a match for other funds secured by the project proponent, if land, water, access, infrastructure, and other issues are resolved at the time a proposed project is presented. EPA also funded a Technical Assistance Committee grant request to allow CTEC, in cooperation with the Restore Our Creek Coalition, to evaluate the end land use of this corridor area to verify the remedial elements constructed are compatible with a future lined creek channel. Future community development work like this that is consistent with the expanded remedy described in the 2020 Record of Decision Amendment and remedial elements will provide for an end land use plan that will contribute to the economic development of Butte.

EPA agrees that delisting (i.e., removal from EPA's CERCLA National Priorities List) portions of the Silver Bow Creek/Butte Area site is an



important part of economic development in Butte. One goal of EPA and Montana DEQ as we oversee and implement the Superfund work described in the BPSOU ROD is to complete the construction of all remedial actions described in an efficient and timely manner so that the long-term protection of human health and the environment is assured and portions of the BPSOU can be delisted (i.e., removed from EPA's CERCLA National Priorities List) as soon as possible.

## **2.12 End Land Use Plan and the Consent Decree**

### **2.12.1 Comment Summary**

One commenter believed that Atlantic Richfield should be held to account for their end land use plan as the company did not implement prior end land use plans for the corridor where Silver Bow Creek above its confluence with Blacktail Creek is located.

- **Comment 66.1b.** “The one thing that the plans promised, and there was one document that was a paper presented in Billings touting the wonderfulness of the plan and how it was carried out and the results, has about aesthetics, the wonderful aesthetics that would be created. And there would be grasses planted, and trees would be planted, and it would look wonderful. And I ask every one of you, tomorrow, to drive by Texas Avenue and look to the right and look to the left and follow it on down and continue looking to the right and to the left. And if you think that's aesthetically pleasing, excuse me. It is not. They were supposed to have planted several different varieties of wonderful trees. And there's a list in here. And I will have a set of these out there for anybody who's interested. Beautiful trees. There are none. There are a few pine trees, evergreens, or whatever they are, that are struggling to survive.

“We are in a city where people care about their yards and their homes, and they keep them up throughout the whole summer, and it's a wonderful city to drive around and just look at those yards. You don't want to drive around what they call the metro storm drain area because there are no aesthetics. And it's something that needs to be addressed. And do I have doubts? Well, I hope that's always going to be green and it's always going to have trees growing and it's going to be wonderfully aesthetical for people to gather in and to enjoy. I hope that's going to be true. But if there are not plans to carry through on the promises that are made, it won't happen. It won't happen and so, we, the citizens of this community, we have rights. And one of those



rights is to live in an environment that's safe, that's pleasant, that's aesthetically wonderful, and that is taken care of, and we have no health concerns from the environment. We have that right. And we need to fight for that right if necessary. And, yes, looks good on paper, but so did the other plan, 2003. And I can assure you those trees and grasses, they're not there. I've gone out and taken pictures of the area and the riprap.”

### **2.12.2 EPA Response**

EPA agrees that an end land use plan is important. If the proposed consent decree is agreed to and lodged with the federal district court, it will contain certain attachments. The end land use plan and its voluntary commitments will be added as an addendum to one of those attachments.

## **2.13 Environmental Justice**

### **2.13.1 Comment Summary**

Four comments were received that spoke to a need to address environmental justice issues in Butte. The specific issues raised (the RMAP, outreach to environmental justice communities, and the scope of health studies) are addressed under separate responses for those topics.

- **Comment 4.8.** “The proposed plan needs a dedicated portion to environmental justice as there is a large environmental justice population in the BPSOU and EPA has a commitment to promote environmental justices in all of its activities. There is also an environmental justice community in the expanded RMAP area.”
- **Comment 7.10.** “A. Environmental Justice. The Proposed Plan Amendment for BPSOU does not address Environmental Justice even though it is required to do so. The Butte Hill is shown in red on the EPA Environmental Justice Screen, meaning it has some of the highest poverty in the nation. Fully 18.9% of Butte-Silver Bow County people live below the Federal Poverty Line (2017). The most vulnerable, children in grades 1 through 4, have a poverty rate of 27.2 here. Butte has an urban Indian population whose poverty rate is not much better than nationally where it surpasses Blacks percentage-wise.”
- **Comment 40.5a.** “Another thing that's important is that with the expanded boundaries for the BPSOU we're incorporating more, you know, environmental justice communities that exist in Butte. And I've always been an advocate of asking the agency to come up with a



concrete action plan to address environmental justice communities within the overall Butte community.”

- **Comment 56.4a.** “Another question is that the environmental justice differential effects need to be considered. By that, I mean that a level of exposure that may not be harmful to the non-poor may be very harmful to the poor because of compromised immune system, lack of access to health care, living in substandard housing. And the differential effects on low income citizens needs to be considered. Butte has a large number of low-income citizens living within the BPSOU. That needs to be considered. Also, the cumulative and synergistic effects of exposure to contaminants of concern needs to be considered.”

### 2.13.2 EPA Response

EPA is directed by Executive Order 12898 to identify and address environmental justice concerns for minority and low-income populations to the maximum extent feasible. Additionally, EPA’s Environmental Justice 2020 Action Agenda is meant to “promote the integration of environmental justice across our nation’s larger environmental enterprise.” EPA takes environmental justice concerns seriously both nationally and at the BPSOU and recognizes that its relationships with community groups and individuals are vital in addressing environmental justice concerns.

Although the proposed plan did not have a specific section for environmental justice, EPA Region 8’s environmental justice program is focused on achieving equal environmental protection so no segment of the population, regardless of race, ethnicity, culture, or income, bears an undue burden of environmental pollution and to ensure that the benefits of environmental protection are shared by everyone. Region 8’s Environmental Justice team works toward advancing environmental justice by focusing on making a difference in environmental justice communities through connecting with, supporting, building the capacity of, and leveraging resources of both internal and external partners.

Over the years, EPA has engaged multiple stakeholders within BPSOU to identify and work toward resolving environmental justice concerns and questions. Recently, EPA worked with Dr. John Ray to draft a pamphlet entitled *Be Contaminant Smart*. This pamphlet provides visual BMPs that residents can follow to reduce exposure to contaminants within the BPSOU. In the future, the EPA remedial team will coordinate with the



Region 8 Environmental Justice team to verify information about and opportunities for residential cleanup are clearly communicated and available to the lower income community in Butte.

## **2.14 Flooding**

### **2.14.1 Comment Summary**

One comment referred to potential flooding caused by the addition of water to Silver Bow Creek by the proposed remedy modification.

- **Comment 10.1.** “As a recent arrival to Butte and a person who works in conservation and environmental science, I am curious about the impact on base flow in Silver Bow Creek. At 5 million gallons per day, that is a potential increase of 10-15%. Could this impact flooding downstream? Could this impact flooding in Anaconda?”

### **2.14.2 EPA Response**

The discharge referred to by the commenter relates to the addition of 5 million gallons per day of treated water to Silver Bow Creek from the next door operable unit—the Mine Flooding Operable Unit. Although this discharge, which just began occurring as part of a pilot project that is part of the remedy for the Mine Flooding Operable Unit, is not a part of the BPSOU remedy or the 2020 BPSOU Record of Decision Amendment, EPA will address the comment directly here.

A flow of 5 million gallons per day is approximately 7.7 cubic feet per second (cfs). The U.S. Geological Survey uses cfs to describe flow rates. Base flow in Silver Bow Creek can be approximated by the mean monthly flow in late summer/early fall. Base flow is 19 cfs at Butte and 54 cfs near Anaconda over the historical gaging record. The addition of the 5 million gallons per day of treated water from the Mine Flooding remedy translates to increase in baseflow of approximately 41% at Butte and approximately 14% near Anaconda.

Flooding happens when water spills out of a stream channel onto the adjacent floodplain, thereby inundating low-lying areas. This type of occurrence happens every 1.5 to 2 years, which is called the bankfull discharge. According to the U.S. Geological Survey (<https://pubs.er.usgs.gov/publication/sir20155019C>), the 1.5-year flood at Butte is 163 cfs, whereas the same flood near Anaconda is 319 cfs. Consequently, the proposed discharge will increase the bankfull discharge by 4.7 and 2.4%, respectively. The relative increase in flood height will be 0.05 feet (0.6 inches) at Butte and 0.02 feet (0.24 inches) near



Anaconda and will diminish for larger flood events ([https://waterwatch.usgs.gov/?id=ww\\_toolkit](https://waterwatch.usgs.gov/?id=ww_toolkit)). As such, the Mine Flooding Operable Unit discharge has relatively little influence on flooding at either location.

## 2.15 Funding

### 2.15.1 Comment Summary

Five comments were received regarding funding commitments and sources for different aspects of the cleanup and end land use plans for the BPSOU. One set of comments stated that funding for the ongoing Parrot Tailings Waste Removal Project, currently being implemented by the State of Montana, through the Natural Resource Damage Program and using its natural resource damage authorities, should be considered Superfund remedial work, and the 2020 BPSOU Record of Decision Amendment and subsequent enforcement mechanism should require Atlantic Richfield to pay for that work by reimbursement to the State of Montana. The second set of comments addressed a commitment made by the State of Montana in the *Further Remedial Elements Scope of Work, End Land Use Additions* document (Atlantic Richfield 2019b) that was released to the public. In that document, the State of Montana stated it would set aside some money from proceeds obtained in any BPSOU settlement in an interest-bearing account for use by the community, in the future, for design or construction of a lined creek in the corridor area. The comments stated that the amount the state would place in that account should be specifically stated at the time the amendment is released.

- **Comment 2.2.** “#1 It is a travesty Arco/BP has been taken “off the hook” for the cleanup and restoration of the Parrott Tailing area and for Silver Bow Creek and its Corridor from Texas Avenue to Casey Street. It is unconscionable that the State is now using Natural Resource Damage Settlement dollars to remove the Parrott Tailing. It is essential however, that these tailings be removed in order to have a proper cleanup of the Creek and to prevent further contamination to the recently cleaned Silver Bow Creek from Butte to the Warm Springs Ponds. ... #3---The removal of certain contaminated tailings east of the County Shops and around the Silver Lake Pipeline---The EPA Arco/BP have refused to accept the removal of contaminated tailings located east of the County Shops in Butte known to Butte residents as Flintstone Park and south of the Silver lake Pipeline located adjacent to Silver Bow Creek where the Drain is located. Arco/BP and the EPA have threatened the State and Local



Government if the removal of these tailings has a negative effect on the Drain.”

- **Comment 7.9** “G. Funding. 13. An interest-bearing account for future Silver Bow Creek Restoration end land use should state a specific minimum amount of dollars and it should receive public comments before the ROD Amendment or CD are finalized. It should not be tied to “leftovers” from other remedy work. 14. State NRD funds loaned for Removal of Parrot Tailings are expected to be returned to the State by the PRP, Atlantic Richfield, because this was Remedy work, not Restoration work. AR erred, insisting toxicity of these tailings was low and unimportant, despite hydrogeologic data to the contrary. Please note within the ROD Amendment that the State of Montana wants these loaned dollars returned so they can rightfully be used restoring Silver Bow Creek.”
- **Comment 68.10.** “So, when Restore Our Creek was formed, remember what their mission -- what our mission statement was. And I wasn't there at the beginning. I joined them after the fact. Remove the tailings, restore the creek. And then maybe some amenities to go with it. Okay. Remove the tailings, restore the creek. The tailings are substantially being removed. Thank you for that. Not deep enough. We ought to be looking at that. Not deep enough, but wide enough. All of you should be looking at how deep they are going. We've looked -- we have seen what happened when they had the digging in the Parrot Tailings. And remember all the assurances of the Parrot Tailings. Well, you know, those aren't all that bad, so we really don't have to dig them out either. We didn't have to dig the tailings out because the agreement was made between the local government and ARCO and EPA that we didn't have to dig the tailings out of the Parrot Tailings. The governor took the bull by the horns and made it happen. Not deep enough, but wide enough. All of you should be looking at how deep are they going. And, by the way, a waste of precious money. He has had to use limited restoration money that could help restore the Butte Hill. He's had to use that to take out the Parrot Tailings instead of it being done under remedy. But now that we dig into it, we find it was much worse than everyone thought.”
- **Comment 74.4.** “4. Set aside funds to help “seed capitalize” a future restored Silver Bow Creek are a near meaningless phantom. No fixed number or specific amount of funds is pledged to this effort.



Allocation of an unnamed amount to the state and asserting that the “leftovers” could provide seed capital is hollow on its face and also not likely to succeed given previous records related to previous “leftovers” purportedly going to the first mile of Silver Bow Creek. The large amount of leftovers from the Streamside Tailings effort were to be available to be allocated to the first mile. But when it was all done, the large (\$40-50 million) leftovers were first claimed by Montana DEQ for its “future needs” in managing the streamside effort and only a small amount was then available for other uses. Asking the people of Butte to accept a similar approach here is not engendering good feelings. The very same DEQ is now to be trusted to provide “leftovers” to help start a new Silver Bow Creek. HA! A good faith approach to this by ARCO/BP would be to provide monies to DEQ for all the purposes they need, but to guarantee a minimum level of leftovers (say \$1 million) that will be seed capital for Silver Bow Creek no matter what. That is a real commitment, not a charade.”

- **Comment 100.7.** “6. Interest-bearing Account. In the End Land Use commitments, the interest-bearing account articulated to be used for Silver Bow Creek Restoration in the future should be a commitment of a specific minimum level of funding and be made available for public review and comment prior to finalization of either the ROD amendments or the CD publication and not be made subject to “remaining money” after other remedial actions are completed.

“7. Use of Remedy Money or Restoration Money. Since this ROD is primarily about the remedy aspects of Superfund on the Butte Hill, ROCC wants to go on record opposing and requesting a reversal of the decision to require use of restoration funds for the cleanup of the Parrot Tailings. Earlier refusals to allocate remedy money for what is now clearly a remedy action in the removal of the Parrot Tailings necessitated the Governor's decision to use limited restoration funds to initiate the removal. The Upper Clark Fork Natural Resource Damage Advisory Council recommended use of restoration funds at the time but asserted that the funds should be used in the near term until remedy funds were allocated for the purpose and requested that the NRD restoration funds allocation be considered a loan to the project. ROCC supports that position and requests that repayment of NRD costs related to the Parrot Tailings removal be part of the remedy obligation of BP/ARCO under these proceedings.”



### 2.15.2 EPA Response

As to the first comment, in 2016, the State of Montana, through the Natural Resource Damage Program and under the direction of the Governor, began implementation of the Parrot Tailings Waste Removal Project to remove the Parrot mine wastes using natural resource damage (NRD) authority. The state implemented this project in accordance with the current Butte Area One restoration plan, which it promulgated pursuant to the CERCLA NRD regulations, which included public comment and response. The state is using its NRD funds, obtained in other settlements with Atlantic Richfield that would otherwise be spent on other restoration actions, for this action. EPA has cooperated with the State of Montana in its implementation of the Parrot Tailings Waste Removal Project by, among other things, agreeing to release to the Upper Clark Fork River Basin Restoration Fund certain state funds obtained under a consent decree known as the Streamside Tailings Operable Unit Consent Decree, because EPA agreed with the state that the funds obtained under that consent decree were no longer needed to complete the remedy for the Streamside Tailings Operable Unit, and the consent decree provided that any unneeded funds would revert back to the Natural Resource Damage Program. Sufficient funds remain in the Streamside Tailings account to address the long-term operations and maintenance of the Streamside Tailings remedy. The state decided to use the released Streamside Tailings Operable Unit funds and other NRD funds on the Parrot Tailings Waste Removal Project. EPA will continue to cooperate and coordinate with Montana DEQ during the Blacktail Creek work to avoid unnecessary delays and increases in cost.

EPA does not believe that the removal of the Parrot Tailings should be part of the remedy selected for the BPSOU and did not include requirements for that removal as part of the BPSOU Record of Decision Amendment. EPA's rationale for this decision is contained in the 2006 Record of Decision, which stated to "reduce the loading of metals to groundwater in the area overlying the Parrot Tailings, infiltration barriers shall be considered during the design phase and implemented if determined to be appropriate by EPA, in consultation with the State." EPA found that the ubiquitous sources of contamination to the BPSOU alluvial aquifer meant that removal of specific sources of contamination, such as accessible portions of the Parrot Tailings, would not result in the cleanup of the alluvial aquifer groundwater to required levels (i.e., groundwater standards). Instead, EPA determined that the remedy should focus on the collection and treatment of contaminated alluvial



groundwater to significantly reduce contaminant loads from the groundwater to surface water and/or sediments in Blacktail Creek and Silver Bow Creek below its confluence with Blacktail Creek, which are the surface water bodies within the BPSOU that are subject to state and federal water quality standards. EPA believes that data gathered since implementation of the groundwater collection and treatment system as part of the 2006 remedy has shown that the system has significantly reduced contaminant loads into Blacktail Creek and Silver Bow Creek below its confluence with Blacktail Creek.

Despite this success, EPA and the state have determined that contaminated groundwater is reaching and impacting both creeks. The amended remedy will require collection and treatment of contaminated groundwater in some additional areas to further limit contaminant loading, and EPA and the state agree that this additional collection of contaminated groundwater is necessary under the remedy. The Record of Decision Amendment and the proposed consent decree documents reflect this determination.

The Montana Natural Resource Damage Program's September 17, 2019 *Response to Public Comments on Final Restoration Plan Amendments for Funding the Parrot Tailings Waste Removal Project* (NRD 2019) document contains the state's response to similar comments regarding using NRD funds for the Parrot Tailings Waste Removal Project. (This document has been made part of the administrative record for the 2020 BPSOU Record of Decision Amendment.) The state, using CERCLA and Comprehensive Environmental Cleanup and Responsibility Act natural resource damage authorities, has determined that it is appropriate to remove the accessible Parrot Tailings waste (including wastes unsaturated by groundwater and wastes saturated by groundwater) and construct an evapotranspiration cover system over inaccessible wastes not saturated in groundwater in order to reduce a significant source of contamination to groundwater.

EPA has worked cooperatively with the State of Montana to assist it in obtaining \$20.5 million as part of the proposed BPSOU consent decree settlement. The state, through the Montana DEQ, is required to use this money to implement the Blacktail Creek Riparian Actions – that is the removal of floodplain and sediment contamination in the Blacktail Creek area within the BPSOU. Any funds remaining from the settlement payment after implementation of the Blacktail Creek work by Montana DEQ, which, as noted in the state's response above, will then be made



available to reimburse, in part, the money transfers addressed in the *Trustee's Modification to Plan Amendments Based on Public Comment, and approval of Plan Amendments as Modified* Office of the Governor of the State of Montana, September 20, 2019, document. (This document has been made part of the administrative record for the 2020 BPSOU Record of Decision Amendment.)

Regarding the comment requesting the State of Montana to set aside a specific amount of money in an interest-bearing account for use by the community of Butte for a lined creek in the area of Silver Bow Creek above its confluence with Blacktail Creek. This is a state issue that is outside the scope of the BPSOU Record of Decision Amendment. The State of Montana may address it separately if it chooses.

Regarding the comment that recent data concerning the contaminated groundwater in the Parrot Tailings area indicate significant new information than that reflected in EPA's prior remediation documents, EPA understands that, since 2017, the state has been collecting additional groundwater data as part of the Parrot Tailings Waste Removal Project area and downgradient as far as Blacktail Creek and the Silver Bow Creek confluence area. EPA will evaluate all available data, including the state's data, as part of the remedial design for the enhancements to the BPSOU groundwater collection and treatment system.

The effectiveness of all aspects of the remedy will be evaluated through the CERCLA-required 5-year review process. When issues affecting the protectiveness of the remedy are identified in a 5-year review, these issues are monitored and tracked for resolution. This process gives EPA further authority and leverage in enforcing and/or potentially modifying the remedy.

## **2.16 Groundwater**

### **2.16.1 Comment Summary**

Seven comments were received that raised issues concerning the interaction between contaminated groundwater and surface water. Two of the comments were supportive of changes to the contaminated groundwater interception and treatment portion of the BPSOU remedy described in the proposed plan. One supportive commenter recommended long-term monitoring of surface water to ensure continued protection of surface water within BPSOU from contaminated groundwater discharge. Another commenter noted that the existing BPSOU groundwater interception system treats large amounts of contaminated groundwater



already and the amendment should not state or imply that this is not the case. One commenter noted that there is insufficient groundwater collection provided by the BPSOU Subdrain<sup>1</sup>.

- **Comment 2.3.** “#2---The Reverse French Drain installed at the base of the Creek to capture contaminated groundwater flowing to the Creek. There is a significant difference between effectiveness of the Drain between the State Natural Resource Damage Program and the EPA and the Atlantic Richfield/British Petroleum Company. The State of Montana is adamant that the drain does not capture the lower area groundwater as believed by the EPA and Arco/BP.”
- **Comment 22.6.** “3.1 CTEC appreciates that the Proposed Plan addresses the risk that contaminated groundwater poses to Blacktail and Silver Bow Creek. EPA’s report, Groundwater and Surface Water Interaction Butte Priority Soils Operable Unit, December 2017, made clear that CTEC’s concerns regarding the continued impact of contaminated groundwater on surface water are supported by site data. Specifically, the data showed groundwater contaminants are being attenuated and accumulating in the stream hyporheic zone and are subject to periodic or episodic release to surface water. CTEC considers it a major step forward that EPA recognizes this threat and that the Proposed Plan provides additional groundwater control, capture, and treatment to address this.”
- **Comment 25.6.** “Groundwater Control. Trout Unlimited supports improvements to groundwater capture and treatment systems along Blacktail and Silver Bow Creeks to reduce the impacts of contaminated groundwater to surface water quality. In addition, a long-term strategy should be implemented to monitor groundwater contaminant concentrations and transport to ensure that the proposed remedy is effective over time.”
- **Comment 31.5a.** “3. Groundwater Contamination. The problem with current and past groundwater contamination is that the cleanup activities have focused on large, locally concentrated areas of contaminated groundwater, such as the Parrot Tailings and (unrelated,

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<sup>1</sup> The BPSOU Subdrain is the gravel-packed piping and pumping system installed in the lower part of Silver Bow Creek above its confluence with Blacktail Creek.



Montana Pole Treatment Plant), where testing has been able to clearly identify significant sources of elevated metals and minerals or other known carcinogens and the boundaries of those underground plumes. The cleanup has not acknowledged sources, such as the Alice pit, that are actively contributing to elevated levels of metals and minerals in the groundwater, or groundwater that is causing metals and minerals to move freely rather than be contained by a cap.”

- **Comment 49.2.** “I don't know how we can talk about streams that aren't connected to groundwater. That's not a stream. That's not a stream if it's not connected to the groundwater. And it's probably a remedy that fits the law somehow, but when we -- when we try to isolate, we don't do it very well. And I think that in looking and thinking about the stream -- and I heard one of you say we have to isolate the stream from this terrible groundwater. I think that's the wrong approach, because it just puts -- kicks it down the road. You know, that -- that groundwater issue is still going to be there long after we're all gone. So why don't we just put the stream there, let it interact with the groundwater. The pollutants that enter from the groundwater are going to enter very, very slowly. We know that. They're not going to come in there all in a big rush and probably won't exceed the standards that you're trying to protect. I just think that somehow there's a disconnect in that part of the whole ROD thinking.”
- **Comment 52.3.** “I think the French drain is a lie. There needs to be more research done. Listen to the people involved. It doesn't work. It's proven. Get a bucket of water and take a look yourself. It doesn't work. You're lying to yourselves and you're lying to this community. The stakeholders in this are not you people, because you get to go home when this is done. We, the people that have fought for this, we have been the enemy. We have been treated very poorly by the State of Montana when we were suing the State. Comments made about us in the capital, the three of us, because we were doing the job of the State, were not very complimentary. We weren't the enemy. We're the people that will live here and remain here.”
- **Comment 98.10.** “Additional Control of Groundwater Discharges to Surface Water. The Proposed Plan includes additional capture and treatment of groundwater in areas adjacent to Blacktail Creek and through the BRW and Slag Canyon area, which will be treated at BTL to meet surface water standards and released to SBC. AR comments



that surface water RAOs are met today at baseflow conditions, and groundwater capture cannot be mandated under remedy beyond that which is required to meet RAOs. With the existing groundwater system in place (as upgraded by AR), there have been drastic reductions of metals loading to SBC. Specifically, during normal flow conditions, when EPA applies chronic standards for comparison, a 96% reduction in yearly median copper concentrations (measured as total recoverable) and dissolved copper concentrations in SBC was achieved between 1993 and 2016; today, federal dissolved standards for contaminants of concern (metals and arsenic) are consistently met, and DEQ-7 standards, measured as the total recoverable fraction, are often met. For example, 2014 monitoring results demonstrated a 97% compliance ratio (equating to one sampling event above DEQ-7 standards every 3 years) during baseflow conditions that meets EPA's RAOs set forth in the 2006 ROD. Thus, the existing BPSOU Subdrain system controls ground water discharges to surface water to the extent necessary for the overall surface water remedy to meet RAOs. Nevertheless, as part of a final CD, AR supports and will agree to a defined and limited expansion of the BPSOU Subdrain system to capture contaminated groundwater beyond that necessary to meet RAOs.

Page 4, Column 2, Bullet 3. "The Proposed Plan states that remedial activities performed to date have included, among other things, "[o]ngoing collection and treatment of some groundwater." The reference to "some groundwater" suggests that most impacted groundwater within BPSOU is not collected and treated by AR, which is misleading. The existing BPSOU Subdrain system captures significant amounts of impacted groundwater (e.g., at least 97% of the metals load in the upper SBC Drainage Basin groundwater), which, as noted above, has resulted in drastic reductions in metals loading to SBC. See Comment No. II.B. AR requests that EPA revise this text; at a minimum, the word "some" should be deleted."

#### **2.16.2 EPA Response**

EPA appreciates and acknowledges comments from CTEC and Trout Unlimited that the proposed plan provides welcome additional contaminated groundwater control, capture, and treatment.

The 2006/2011 BPSOU Record of Decision required the upgrade of existing BPSOU groundwater capture and treatment systems and also



contained a contingency for the implementation of additional contaminated groundwater capture if shown to be necessary. EPA's 2018 *BPSOU Groundwater and Surface Water Interaction Report* (EPA 2018c) and various State of Montana data collection and analysis reports, which are part of the administrative record for this 2020 BPSOU Record of Decision Amendment, demonstrated continued discharge of contaminated groundwater to surface water in areas within BPSOU, possibly resulting in additional contaminated sediments and surface water quality impacts within those water bodies during both baseflow and high flow conditions. EPA exercised the contingency provided in the 2006/2011 BPSOU Record of Decision and is now requiring the settling defendants to capture additional contaminated groundwater in any areas within the BPSOU where it is unacceptably impacting sediments or impacting surface water quality at the two compliance points. Sediment and surface water performance monitoring is described in the BPSOU Surface Water Management Plan (EPA 2019b), and surface water compliance monitoring is described in the BPSOU Surface Water Compliance Determination Plan (EPA 2019a), both of which are attached to the proposed consent decree. EPA is also requiring substantial mine waste and contaminated sediment removal in the Butte Reduction Works and Blacktail Creek area. If the proposed consent decree is entered, Montana DEQ will perform the actual waste removal construction at the Blacktail Creek area to remove the contaminated sediments, tailings, wastes, and impacted soils from the Blacktail Creek and confluence areas, using funds provided by Atlantic Richfield. EPA expects that the combination of these waste removals and contaminated groundwater capture actions will result in the long-term protection of surface water quality and sediments within BPSOU.

EPA agrees that the proper implementation of these additional efforts will prevent or mitigate the migration of contaminated groundwater into the stream hyporheic zone and prevent in-stream sediment contamination and release into Blacktail Creek and Silver Bow Creek below Blacktail Creek's confluence with Silver Bow Creek.

During remedial design, the issue of the interaction of groundwater with reconstructed surface water floodplains will be carefully examined. The goal will be to protect surface water quality and sediments by preventing contaminated groundwater that is not captured by the expanded groundwater interception system from discharging into the creeks. Isolation can occur by building the new stream channel at a higher



elevation than the groundwater (which was done previously in the Lower Area One reconstructed stream), either with or without a liner, to contain the stream water. Without a liner, surface water will infiltrate from the elevated creek bed into groundwater. With a liner, the surface water is contained within the stream through the lined portion of the elevated channel. Elevation of the stream channel and installation with a stream liner are often combined to prevent increases in groundwater volumes and changes to the local groundwater flow regime that may occur in response to increasing the supply of water to the groundwater system. All of these issues will be carefully examined during remedial design of the further remedial elements required in the 2020 BPSOU Record of Decision Amendment.

Use of liners to isolate reconstructed streams within the Butte Reduction Works will be examined during remedial design. EPA agrees that this should be done in as limited a manner as possible, if at all. However, allowing contaminated groundwater to flow into a reconstructed portion of these water bodies would not meet the goal of protecting surface water or sediment quality. Contaminated groundwater will be collected and treated before it would enter a creek either through extension of the hydraulic control channel or at the Butte Treatment Lagoons collection ponds or additional groundwater controls.

In the Silver Bow Creek area above the confluence with Blacktail Creek, community efforts to construct a creek in this area after implementation of the remedy will require use of a liner to protect groundwater from increasing the amounts of contaminated groundwater that need to be kept from discharging to the creeks or changes to the groundwater flow regime. The requirement for a liner separates the surface water from the groundwater, thereby reducing potential impacts to either medium. This is because the groundwater in this area will remain contaminated, despite the additional removal actions undertaken under the expanded remedy or other removals using natural resource damage authority. Constructing a stream that would allow this contamination to infiltrate into the corridor and then enter the downstream surface water bodies would be contrary to the goal of establishing surface water within Blacktail Creek and Silver Bow Creek below its confluence with Blacktail Creek that meets water quality standards and contains sediments which are below sediment performance criteria, which are described in the amendment, i.e., meeting surface water quality standards within Blacktail Creek and Silver Bow Creek below its confluence with Blacktail Creek. EPA has worked with



Restore Our Creek Coalition and other community members regarding this issue and will continue to work with them as end land use plans for the corridor area are established in the future.

Long-term groundwater and surface water monitoring will be conducted in accordance with the agency-approved groundwater monitoring plans developed by the responsible parties. These required plans will be updated, reviewed, and approved annually by EPA in consultation with Montana DEQ.

EPA disagrees with the request to remove the word “some” from the description of groundwater collection to date (Comment 98.18). “Some” does not necessarily imply a small quantity. “Some” means simply “not all.” EPA acknowledges that the existing BPSOU groundwater interception and treatment system, which consists of the hydraulic control channel in the Lower Area One area and the BPSOU Subdrain, captures and treats significant quantities of contaminated groundwater. This has resulted in greatly improved surface water quality in Blacktail Creek and Silver Bow Creek below its confluence with Blacktail Creek.

## 2.17 Health Studies

Nineteen comments were received regarding the health studies. Most comments received were related to expanding the medical monitoring study to include more than blood lead monitoring of children, including evaluating other contaminants of concern (e.g., arsenic) and older age groups and clarifying the specific components, objectives, and interpretation of the health studies specified in the proposed plan. Responses to comments were prepared with substantial input from Butte Silver Bow County and are presented individually after each comment.

- **Comment 4.4.** “While the focus of the current Health Study is clearly articulated to be an analysis of blood lead levels in children, there is also, as we can see from the above statement from the Final Residential Metals Abatement Program Plan, a mandate for, eventually, a more encompassing and expanded health study. When will provisions and a proposed plan for a more comprehensive health study, as articulated in the Final Residential Metals Abatement Program Plan, be formulated and announced? The Proposed Plan for BPSOU needs to include such a provision.

“To the extent allowable and to the extent possible, the Health Study should also:



1. Consider the health effects of exposure to other contaminants of concern in Butte in addition to lead. The focus needs to be expanded beyond lead levels in children. For example, as mandated, it is now time to look comprehensively at arsenic exposure in Butte and the health effects of this arsenic exposure. Why is lead still the driver of the health study, particularly given that the lead found in Butte has relatively low bioavailability while the arsenic found in Butte has high bioavailability? There is an articulated mandate to investigate arsenic exposure and the health effects of arsenic exposure in Butte. Why hasn't this been done? When will it be done? Lead data may be the so called "low hanging fruit" but that does not eliminate the need to systematically investigate arsenic which is more bio-available than is lead in Butte.
2. (This comment is addressed under Action Levels, section 2.252.2.2)
3. The current health study needs to firm up what we will consider beyond lead and how we will do it.
4. The assumption cannot be made, as it is now, that if you cleanup lead you cleanup the other COCs.
5. Age groups in addition to children need to be investigated.
6. Diseases related to the COCs other than cancer need to be investigated.
7. The differential effects of exposure to the COCs on Butte's environmental justice community of low-income citizens needs to be investigated. In general, the current health study has not given sufficient consideration to environmental justice concerns in Butte.
8. The synergistic and cumulative effects of exposure to the COCs need to be considered.
9. The purpose of the health study needs to be clarified.
10. There needs to be developed a long term plan for future health studies.
11. Air quality issues related to waste depositories needs to be investigated.
12. The concept medical monitoring needs to be clarified.

"Of course, given limitations of data and data gathering as well as methodological limitations for analysis, definitive answers to some of



the questions posed above may be difficult. So, the next question becomes what could be done that is not now being done in terms of remediation activities? Are we missing anything that could be done to protect human health from exposure to the toxics of concern?”

**EPA Response.** The 5-year medical monitoring study process currently allows for a robust look into the health of Butte-Silver Bow residents. While the current medical monitoring study process, by design, prompts study into elevated blood lead levels of children—lead being the primary contaminant of concern—the study process also enables investigation into other areas. For example, the most recent study process enabled the Montana Department of Public Health and Human Services to conduct a non-Superfund investigation into cancer rates in Butte-Silver Bow. Additionally, the Butte-Silver Bow Health Department routinely engages in other non-Superfund studies. An example is an in-depth community health needs assessment conducted every 3 years, focusing on more than 100 broad health measures.

The 5-year medical monitoring study process remains focused on elevated lead because elevated lead is more prevalent in Butte than elevated arsenic and mercury. Since 2010, however, arsenic and mercury biomonitoring have been offered under the RMAP when environmental sample concentrations in soil or dust are high enough to warrant such testing, which is a rarity. The RMAP plan has also been amended to prioritize any residential area where children are found to have blood lead levels above 5 micrograms per deciliter ( $\mu\text{g}/\text{dL}$ ), which is the current Centers for Disease Control and Prevention’s reference level (and this too is a rarity). Any arsenic and mercury biomonitoring data obtained moving forward will be used in future health studies. Currently, a proactive approach to biomonitoring is conducted on behalf of all children in the BPSOU. Moving forward, biomonitoring will be available to all BPSOU residents, including adults, upon request.

In further regard to potential diseases related to contaminants of concern, the Butte-Silver Bow Health Department has in recent years asked the Agency for Toxic Substances and Disease Registry (ATSDR) to look into neurological disease rates in Butte-Silver Bow. ATSDR has declined, saying there is no indication of elevated rates in Butte. According to ATSDR, there is no national database of neurological disease rates to develop comparative data. ATSDR has



also been asked to conduct a health study in Butte in regard to arsenic exposure; ATSDR declined, saying there is no indication of problematic exposure in Butte. In fact, ATSDR indicated that the levels of arsenic in soils in Butte are much lower than in Anaconda, a city that was subject to a recent ATSDR exposure investigation. The conclusion of the recent Anaconda investigation was that levels of blood lead and urinary arsenic measured in Anaconda residents are comparable to the rest of the U.S. population, as reported in the National Health and Nutrition Examination Survey database. Therefore, ATSDR concluded that a population-based investigation in Butte regarding arsenic exposures would not produce results that would be meaningful. EPA will continue to work with ATSDR and the Butte Silver Bow County Health Department to assess health concerns within Butte where warranted.

In regard to outreach to populations facing barriers to health, such as the barrier of low income, a full-time clinical environmental health employee of the Butte Silver Bow County Health Department will conduct outreach to such populations to provide education about contaminants and various protective practices, such as safe gardening techniques. This employee will also work within the Butte Silver Bow County Health Department's Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) program, which serves low-income populations and populations with other barriers to health. Under this employee's leadership, biomonitoring in the WIC program will continue and follow-up testing for suspect elevated blood lead levels will be conducted on-site. Further follow-up will also occur with area pediatricians and other healthcare providers. Moving forward, the RMAP will continue to request access to all BPSOU properties to conduct environmental assessments and will conduct environmental assessments upon request outside of the operable unit.

- **Comment 5.5.** "I would like to see a periodic reevaluation of what kinds of data should be collected for the regular 5-year health studies in the community. We should be actively collecting data from young and old alike about other health problems potentially stemming from exposure to heavy metals. The science in this area is evolving and the community studies could provide valuable data that could be of use worldwide, not just in Butte or similar U.S. Superfund sites."



**EPA Response.** The 5-year medical monitoring study process remains focused on elevated lead because elevated lead is more prevalent in Butte than elevated arsenic and mercury. Since 2010, however, arsenic and mercury biomonitoring have been offered under the RMAP when environmental sample concentrations in soil or dust are high enough to warrant such testing, which is a rarity. Going forward, any arsenic and mercury biomonitoring data obtained will be used in future health studies. The 5-year medical monitoring study will continue to be responsive to evolving science and evidence.

- **Comment 7.12.** “16. Mental Health while living amid contaminants: I’ve since heard a speaker tell of negative consequences to mental health of people who grow up living in contaminated areas. Our godchild took her own life at age 15. Butte has one of the highest suicide rates in the state, which is one of the highest in the nation. Has EPA investigated how pollution affects the mental health of people who live among contaminants? Please address this.”

**EPA Response.** The community health needs assessments conducted routinely by the Butte-Silver Bow Health Department survey 400 county residents by landline and cellular telephone. Another 300 “key informants” are asked their opinions about reigning health issues in the county. Concerns related to mental health (e.g., how people feel mentally, whether they have access to mental health providers) are addressed. The results of these studies are published every 3 years.

- **Comment 7.15.** “19. School Children and Blood Lead Levels: The last time I checked, there was no testing of children in school settings to determine if any have high blood lead. Please work with the Butte Silver Bow Health Department to implement this so that the few children who may fall through the cracks are, instead tested.”

**EPA Response.** The Butte-Silver Bow Health Department’s clinical environmental health employee will conduct outreach to Butte schools to educate about the RMAP, the availability of blood lead sampling, and the risks associated with lead exposure. Because of Health Insurance Portability and Accountability Act of 1996 (known as HIPAA) concerns, testing within school settings could be problematic, but referrals to the Butte-Silver Bow Health Department, including through its CONNECT referral system, could occur on an individual or group basis.



- **Comment 7.18.** “22. Butte’s Health Study is again not thorough. In public comment meetings, I have asked for more contaminants to be included and for more types of people to be included. Not just Lead, but Arsenic, Mercury and Cadmium and Crystalline Silica. It is endemic to Butte soils, and was named a IA carcinogen by the International Agency on Research on Cancer in 1996. Because health effects from exposure to Butte’s Contaminants of Concern often do not show up until later in life, a more comprehensive study is in order, one that includes the elderly where disease effects from at least Lead are known. I have had two major cancers, ovarian and bladder, so have an obligation to help bring to light factors that may be involved. I believe Butte needs a robust health study with ongoing monitoring. I must say that it will also be very helpful toward getting a good health study if the negotiating parties would help to stop the defensiveness and discounting of the work of highly qualified independent researchers who have done studies of Butte health issues.”

**EPA Response.** EPA understands the community is interested in expanding future health studies to include other chemicals and age groups. As stated in the BPSOU ROD, lead, arsenic, and mercury were identified as the human health contaminants of concern for the Site. The site risk assessments evaluated other contaminants of concern, such as cadmium, and did not find these to be important contributors to human health risks. Thus, inclusion of other contaminants, beyond lead, arsenic, and mercury, in the RMAP medical monitoring study is beyond the scope of the Superfund remedy. RMAP data collected through May 2013 suggest that elevated lead is more prevalent in Butte than elevated arsenic and mercury. For example, 89% of all properties that exceeded a yard soil action level were due to lead alone. For homes where an indoor dust action level was exceeded, including in attics or basements, 44% were due to lead alone whereas less than 1% was due to arsenic alone. In all of the RMAP soil and dust samples, there were only two properties with yard soils exceeding the mercury action level and six with indoor dust exceeding the action level. All of those properties also had lead exceedances. Arsenic and mercury biomonitoring have been offered under the RMAP since 2010 but only when environmental sample concentrations in soil or dust are high enough to warrant such testing, which is a rarity. Because the environmental concentrations were seldom high enough to offer such testing, there are no comparable arsenic and mercury biomonitoring data. EPA will continue to work



with the Butte Silver Bow County Board of Health, ATSDR, and the Montana Department of Public Health and Human Services to find resources for the evaluation of broader human health concerns such as those described by the commenter.

- **Comment 8.7.** “As Dr. Seth Cornell argued in the April 11 public hearing, the mandate for the Health Study Working Group needs to be strengthened, not diluted, as the current version of the plan seems to suggest. This group provides a venue both for ongoing public involvement and agency investigations of public health concerns that has relevance to past, ongoing, and proposed remedial activities. It’s at the heart of Superfund’s mission (“protect human health and the environment”). Take more care to get this right: be more attentive to assuring the community that you’ve got their back, and that this program will be around not merely as a once-every-five-years bureaucratic requirement, but as an active resource. Using risk assessments as a basis for remedial guidelines is only acceptable if it’s matched by ongoing surveys of actual health concerns in the community.”

**EPA Response.** The City and County of Butte-Silver Bow and Atlantic Richfield, as settling defendants, will strengthen and better define the Medical Monitoring Study Working Group, which advises and informs the medical monitoring study process. One idea is to clarify what is required under Superfund authority, which is a 5-year medical monitoring study, and what can be accomplished using a larger Community Health Working Group through the Butte Silver Bow County Health Department, which can look at broader issues as needed and as funding is available. Once the Superfund medical monitoring study is issued to the public, work on the next study will begin, with a focus on the daily activity of biomonitoring and routine check-in on monitoring and outreach efforts. This check-in should verify that gaps in collection of biomonitoring data are eliminated. Butte-Silver Bow, specifically its health department, will be responsible for determining the Community Health Working Group’s membership and facilitating working group meetings, with insight and input from selected members of the public. The Community Health Working Group meetings may focus on mining-related environmental contaminant data when produced (e.g., medical monitoring studies). However, the Community Health Working Group meetings and communications can also be a forum for



discussion on other health studies being carried on outside of the Superfund process, including the routine community health needs assessments conducted by the health department.

- **Comment 9.3.** “The city of Butte, being known for its super fund cleanup, hampers new business as well as concerns for human safety for the entire community. Why would business and children entering adulthood and the work force, want to stay if not living in a clean, healthy environment. There should be monitoring and studies of all health concerns, not just the lead levels in our children.”

**EPA Response.** In addition to the 5-year medical monitoring study, other non-Superfund health studies and investigations are routinely conducted, including community health needs assessments conducted by the Butte-Silver Bow Health Department every 3 years. These assessments, conducted with a scientific margin of error, gauge human health in Butte via more than 100 broad health measures. EPA will work with the Butte-Silver Bow Health Department to provide accurate information concerning Butte’s public health status, which is anticipated to demonstrate that Butte is a safe and healthy place to live and work.

- **Comment 12.3.** “The proposed plan makes a modification intended to “better describe the mandate for future health studies” because the 2006/2011 ROD does not “specifically describe their exact nature” (at pg 19). However, the language included in item number 11 of the list of non-significant or minor modifications to the existing remedy does little to better describe the health studies mandate. In fact, the language makes it entirely unclear as to who will perform the health studies, how the health studies will be funded, what the studies will cover, what and how the data will be collected, and how the public will be able to access the results. This modification is lacking and needs work in order to achieve the desired results and assure the people of Butte that our health will indeed be studied to ensure the remedial objectives are being fulfilled. As I understand it, Atlantic Richfield has agreed to fund and conduct these periodic studies and has agreed to place the human health study language into the Residential Metals Abatement Program (RMAP) plan. However, the proposed plan at hand lacks any reference to those agreements. Instead, the modification in number 11 states that Butte Silver Bow will “evaluate” the studies without explaining who will execute the



studies, the nature of the studies, and how they will be funded. I can only assume that the reference to the Medical Monitoring Working Group is an effort to acknowledge the health study process, yet it leaves more questions than answers. I strongly recommend a reference to this other agreement and a better explanation of the health studies' contents, funding structure, and continued existence."

**EPA Response.** As settling defendants, Butte-Silver Bow and Atlantic Richfield are mandated by EPA to conduct the medical monitoring study every 5 years for the next 25 years. With funding from Atlantic Richfield through the Allocation Agreement, the studies will be conducted with the assistance of retained consultants who assist the working group in reviewing biomonitoring data and explaining findings to the lay public. These data will continue to be collected from pediatric clients within the health department's WIC program and from other pediatric and adult populations who request testing at the health department. The 5-year medical monitoring health study process will remain focused on elevated lead because elevated lead is more prevalent in Butte than other contaminants, including arsenic and mercury. Since 2010, however, arsenic and mercury biomonitoring have been offered under the RMAP when environmental sample concentrations in soil or dust are high enough to warrant such testing, which is a rarity. Any arsenic and mercury biomonitoring data obtained moving forward will be used in future health studies. EPA's unilateral administrative order, which requires this type of medical monitoring study, will include more detail on what is required, and the revised and expanded RMAP plan that will be required under the unilateral administrative order will further define the scope of this required study. As noted above, EPA will work with ATSDR and the Butte-Silver Bow Health Department to conduct broader public health evaluations through the health department as needed.

- **Comment 16.1** "Is there opportunity for the health studies to incorporate research about co-occurring metals rather than simply looking at lead blood levels only? In the literature, there is a developing body of knowledge that points to toxicity and human health risks being amplified by exposure to multiple metals at one time. In addition, there should be some studies that examine the mental health effects of living with 'Superfund status'. Is there distress caused by living within a known contamination zone? Do Butte



citizens understand the nature of the contamination and their true health risks?”

**EPA Response.** The 5-year medical monitoring study process will remain focused on elevated lead because elevated lead is more prevalent in Butte than other contaminants, including arsenic and mercury. Since 2010, however, arsenic and mercury biomonitoring have been offered under the RMAP when environmental sample concentrations in soil or dust are high enough to warrant such testing, which is a rarity. Any arsenic and mercury biomonitoring data obtained moving forward will be used in future health studies. The community health needs assessments conducted routinely by the Butte-Silver Bow Health Department survey 400 county residents by landline and cellular telephone and another 300 other “key informants” are asked their opinions about reigning health issues in the county. Concerns related to mental health (e.g., how people feel mentally, whether they have access to mental health providers) are addressed. The results of these studies are published every 3 years. Along with RMAP outreach personnel, the health department’s clinical environmental health employee will perform outreach to the community, including neighborhoods with particular barriers to health, to educate about lead and other contaminants and the opportunity the RMAP represents for residential testing.

- **Comment 22.11a.** “6.5 The ROD amendment should specifically require future health studies to include the components identified in the 2010 RMAP Plan. The decision document must specifically ensure that the on-going health study process continues. 2010 RMAP Plan requirements are as follows: Identifying chemicals that the residents may have been exposed to; Compiling and interpreting toxicology information on those chemicals; Routes of exposure; Compiling and interpreting the morbidity and mortality statistics as an epidemiology study; Compiling and interpreting health studies; and Compiling and interpreting influencing factors (environmental or cultural) for mortality rates. The public health studies will also include review of the latest epidemiological literature to determine if there are any newly established links between the contaminants of concern and specific diseases. Data gathered through the Residential Metals Abatement Program's (RMAP) routine activities and the results of previous health studies will be utilized to determine the content of



future health studies and potential improvements to RMAP routine activities.

**EPA Response.** The 2010 RMAP plan and its enhancements in the draft 2016 plan will continue to be a guide for studies moving forward. This includes the Superfund Medical Monitoring Working Group identifying residential exposures (consistent with human health contaminants of concern); compiling and interpreting related toxicology information; discussing and addressing routes of exposure; compiling and interpreting morbidity/mortality statistics; discussing various non-Superfund health studies, such as routine community health needs assessments; and discussing influencing factors for mortality rates. The Superfund Medical Monitoring Study Working Group and its retained consultants will also continue to collect and discuss the latest epidemiological literature for newly determined links between contaminants of concern and disease. Past studies will continue to inform future studies. As noted above, EPA's unilateral administrative order, which will require this type of study, will include more detail on what is required, and the revised and expanded RMAP plan that will be required under the unilateral administrative order will further define the scope of this required study. As noted above, EPA will work with ATSDR and the Butte-Silver Bow Health Department to conduct broader public health evaluations through the health department as needed.

- **Comment 22.11b** "6.6 CTEC supports the proposal to formalize involvement of the Medical Monitoring Working Group in future health studies. The Medical Monitoring Working Group allows local citizen involvement, including local health and toxicological experts, in the health study process. Public health concerns related to Superfund issues remain confusing and contentious. Incorporating local citizen experts in this process can help to lessen public concerns and perceptions that Superfund has not resulted in Butte being a safe place to live. It will also empower Butte citizens to police their own community health, providing a system of checks and balances for agency or responsible party decisions. The amended ROD should be clear that the Medical Monitoring Working Group is an active resource which will provide a continuity of attention to community concerns, not simply a once-every-five-years bureaucratic requirement."



**EPA Response.** The City and County of Butte-Silver Bow and Atlantic Richfield, as settling defendants, will strengthen and better define the Medical Monitoring Study Working Group. This working group advises and informs the medical monitoring study process. One idea is to clarify what is required under Superfund authority, which is a 5-year medical monitoring study, and what can be accomplished using a larger Community Health Working Group through the Butte Silver Bow County Health Department. The larger working group can look at broader issues as needed and as funding is available. Butte-Silver Bow, specifically its health department, will be responsible for determining the Community Health Working Group's membership and facilitating working group meetings, with insight and input from selected members of the public. The Community Health Working Group meetings should focus on other mining-related environmental contaminant data when produced. However, the Community Health Working Group meetings and communications can also be a forum for discussion on other health studies being carried on outside of the Superfund process, including the routine community health needs assessments conducted by the health department.

- **Comment 22.11c** “6.7 Authority for health study direction should reside with Butte-Silver Bow Health Department with concurrence from the Board of Health. It needs to be clear in the ROD amendment that contractors working on future health studies are working on behalf of the Medical Monitoring Working Group. Both the Health Department and the Board of Health should have an officially defined oversight role.

**EPA Response.** Authority for direction of the medical monitoring studies required under Superfund will reside with the settling defendants, Atlantic Richfield and Butte-Silver Bow—specifically, the Butte-Silver Bow Health Department—with governing guidance from its Board of Health. Future contractors involved in future medical monitoring study processes will work on behalf of the settling defendants with oversight by EPA and Montana DEQ.

- **Comment 22.11d** “6.8 Future health studies should address all site contaminants of concern if future toxicological information or epidemiology suggests they are toxic. The site contaminants aluminum, cadmium, copper, iron, silver, and zinc are not currently identified as contaminants of concern (COCs) for solid media.



Toxicological information available when the solid media COC list was decided may not have supported the potential human toxicity of these other site contaminants at concentrations apparent in Butte. Future information could reverse this finding and show these contaminants to be toxic to human health alone or in combination with other site contaminants. The amended ROD should ensure that future health studies will address potential exposures to these other metals if new information suggests they are toxic.”

**EPA Response.** As noted above, EPA will work with ATSDR and the Butte-Silver Bow Health Department to conduct broader public health evaluations through the health department as needed. The consent decree also preserves EPA and Montana DEQ’s ability to require additional work at the BPSOU if future information or conditions indicate human health concerns caused by contaminants of concern are warranted, such as information developed similar to what the commenter notes may occur.

- **Comment 40.6.** “And I think attention also needs to be paid to the effect of these contaminants of concern on environmental justice community in Butte. By that, I mean, for low income citizens. An exposure level that might be safe for people who are wealthier, who have better access to health care, perhaps better diets, an exposure level that might not affect those people may be very detrimental to low income citizens who don't have access to health care, who don't have adequate diets, who live in substandard housing. And so one-size-fits-all approach just doesn't work in every case. And I think the health study needs to specifically address that issue.

“Another thing I would like to comment on is the health study gets some kind of mention in this proposed plan. Currently, every five years EPA has mandated a study focused on lead levels in children to ascertain whether or not the RMAP program is being effective. And I think that's important. But I think it's important, too, to try within the limitations of Superfund law to consider the overall question, "Has Superfund been effective in protecting the public health in Butte?" And in order to do that we're going to have to look at more than lead levels in children. We're going to have to look at the effect of other contaminants of concern, such as mercury and cadmium on public health, other age groups than children. We're going to have to look at diseases other than cancer that can be related to these contaminants of



concern. We should look at the synergistic effect of exposure to these different contaminants, as well as the cumulative effect.”

**EPA Response.** In regard to outreach to populations facing barriers to health, such as the barrier of low income, a full-time clinical environmental health employee of the health department will conduct outreach to such populations to educate about contaminants and various protective practices, such as safe gardening techniques. This employee will also work within the health department’s WIC program, which serves low-income populations and populations with other barriers to health. Under this employee’s leadership, biomonitoring in the WIC program will continue, and follow-up testing for suspect elevated blood lead levels will be conducted on-site. Further follow-up will also occur with area pediatricians and other healthcare providers. Along with RMAP outreach personnel, the health department’s clinical environmental health employee will perform outreach to the entire community, including those neighborhoods with particular barriers to health, to educate about lead and other contaminants and the opportunity the RMAP represents for residential testing.

- **Comment 45.2.** “I want to bring up a point that Dr. Ray had mentioned. He said that something in this proposed amendment needs to be discussed, the health study. Well, everything else is speculation. So we talk about risks, we talk about exposure. The bottom line is how is the community doing, what's the health of the community. That's the bottom line. And the only way we determine that is through health studies. There's a mandate in the RMAP program that says that we need to have a health study every five years. And right now there's a health study going on, and it's, basically, looking at lead blood levels in children. That's the same thing that we did in 2014 and the same thing we're doing in 2019. Many community members came forward and said, "Hey, this isn't enough. Blood lead levels in children is not enough to help us out about the health of the community." You need to expand the study. You need to expand the scope. In fact, you don't need to expand the scope. You just need to adhere to what the mandate is for the health study. Now, tucked away on the last page of this proposed amendment, on Page 19, proposed minor changes, it says, "Better describe the mandate for future health studies." Better describe the mandate for future health studies. It says, "The 2006/2011 ROD requires future human health studies on a periodic basis but does not



specifically describe their exact nature." According to this document, they do not specifically describe their exact nature.

"Well, in fact, it does. It very clearly describes what the health study should include. And I encourage you to look at the RMAP document that spells out exactly what the health studies should include. It says, "The health studies will include" -- this is verbatim -- "Identifying chemicals that the residents may have been exposed to; Compiling and interpreting toxicology information on those chemicals; Routes of exposure; Compiling and interpreting health studies; Compiling and interpreting influencing factors (environmental or cultural) for morality rates. "The public health studies will also include review of the latest epidemiological literature to determine if there are any newly established links between the contaminants of concern and specific diseases. "Data gathered through the RMAP routine activities and the results of previous health studies will be utilized to determine the content of future health studies and potential improvements to RMAP routine activities." It very specifically says what these health studies are supposed to do.

"They're trying to sneak through. They say they're going to better clarify these health study. Let me tell you how they can better clarify the health studies. It says Butte-Silver Bow County. So it's putting the onus on the county here. It says -- there's nothing about bringing control to the community's health studies. "Butte-Silver Bow County, in coordination with the Medical Monitoring Working Group, will periodically evaluate medical monitoring, data approaches and data compiled under the medical monitoring program every five years for a period of 30 years."

"I don't know what that means. I'm a physician in the community. I have no idea what this means. I don't know how that clarifies the future health studies. They're trying to get one over on us here. Everything else is speculation about how the cleanup is doing. We need to know about the health of the community. And we need to do it here in the mandate, the original mandate. It says exactly what these health studies should do. I think the, you know, this supposed minor change, this changes the scope of the remedy.

"This is everything right here. The health study is everything. It changes the scope. It is not a minor change. It's changing the scope of the remedy. And I certainly hope when you go home you review the



documents on Page 19 of this 22-page document. And look at it and talk to your friends and get them to come out to this meeting. If nobody -- if people don't show up, this is going to just slide through. There will no longer be a health study. We will never know if remediation has been effective. We have to show up. You've got to read up, you've got to stand up and you've got to show up. Because, if not, we're going to get, someone said, a crappy remedy. So that's all I have. I hope this room is full come May 23."

**EPA Response.** In addition to the Superfund health studies processes, numerous other studies on the health of Butte-Silver Bow residents are routinely carried out, including community health needs assessments that are conducted every 3 years, with more than 100 broad health measures. The Butte-Silver Bow Health Department collaborates with Butte's nonprofit acute care hospital, St. James Healthcare, in carrying out these 3-year studies looking at Butte's health through more than 100 broad health measures. The Butte-Silver Bow Health Department pays for its portion of the 3-year studies through the health initiatives account of the Redevelopment Trust. The 2010 RMAP plan and its draft 2016 update will continue to be a guide for health studies moving forward. This includes the working group identifying residential exposures; compiling and interpreting related toxicology information; discussing and addressing routes of exposure; compiling and interpreting morbidity/mortality statistics; discussing various non-Superfund health studies, such as the routine community health needs assessments; and discussing influencing factors for mortality rates. The working group and its retained consultants will also continue to collect and discuss the latest epidemiological literature for newly determined links between contaminants of concern and disease. Past health studies will continue to inform future health studies.

The entire health studies budget will be moved to the oversight of the Butte-Silver Bow Health Department. The 2010 RMAP plan describes the chemicals and contaminants of concerns that are of interest in the community and therefore studied; the draft 2016 RMAP plan provides new enhancements and data approaches. The 5-year medical monitoring studies were never intended to look at the entirety of contaminants of concern in the BPSOU; the studies were intended to look at contaminants linked to the RMAP—lead, arsenic and mercury. The medical monitoring studies have one chief mandate—



to look at whether the RMAP is effective. As noted above, EPA will work with ATSDR and the Butte-Silver Bow Health Department to conduct broader public health evaluations through the health department as needed.

- **Comment 56.3.** “I want to say a little bit about the health study, and the basis for my comments on the health study is not just what's in the proposed plan, but also what is in the work plan for the RMAP program that calls upon going beyond simply looking at lead levels in children and doing biomonitoring studies, but does call for looking at the health effects of all the contaminants of concern in the Butte area. To that end, I would ask that, one, we need to move beyond looking at just lead levels in children and look at other contaminants of concern. Arsenic, for example, needs to be thoroughly analyzed. The effects of the contaminants of concern on the population other than children needs to be considered. Secondly, there is a call to review data to see what new developments they are and epidemiology in terms of the toxic effects of the contaminants of concern. But what is not spelled out is, "Okay, we'll do these reviews," but how will these reviews actually impact the cleanup, what efficacy will these reviews have. They are not just, hopefully, academic exercises but have some efficacy that needs to be spelled out. Next, look at other diseases other than cancer. The focus is on cancer, which is certainly important, but the contaminants of concern in Butte can create other health effects other than cancer.”

**EPA Response.** While the current medical monitoring study process by design prompts study into elevated blood lead levels of children, lead being the primary contaminant of concern, the study process also enables investigation into other areas. For example, the most recent study process led to an independent non-Superfund investigation, conducted by the Montana Department of Public Health and Human Services, into cancer rates in Butte-Silver Bow. Additionally, the Butte-Silver Bow Health Department routinely engages in other non-Superfund studies. An example is an in-depth community health needs assessment conducted every 3 years, focusing on more than 100 broad health measures. The 5-year medical monitoring study process remains focused on elevated lead because elevated lead is more prevalent in Butte than elevated arsenic and mercury. Since 2010, however, arsenic and mercury biomonitoring have been offered under the RMAP when environmental sample concentrations in soil or dust



are high enough to warrant such testing, which is a rarity. Any arsenic and mercury biomonitoring data obtained moving forward will be used in future health studies. Currently, a proactive approach to biomonitoring is being conducted on behalf of all children in the BPSOU, but moving forward, biomonitoring will be available to all BPSOU residents upon request. In further regard to potential diseases related to contaminants of concern, the Butte-Silver Bow Health Department has in recent years asked the ATSDR to look into neurological disease rates in Butte-Silver Bow. ATSDR has declined, saying there is no indication of elevated rates in Butte. Also, according to ATSDR, there is no national database of neurological disease rates to develop comparative data. ATSDR was asked to conduct a health study in Butte regarding arsenic exposure; ATSDR declined, saying there is no indication of problematic exposure in Butte. In fact, ATSDR indicated that the levels of arsenic in soils in Butte are much lower than in Anaconda, a city that was subject to a recent ATSDR exposure investigation. The conclusion of that investigation was that levels of blood lead and urinary arsenic measured in Anaconda residents are comparable to the rest of the U.S. population as reported in the National Health and Nutrition Examination Survey database. Therefore, ATSDR has concluded that a population-based investigation in Butte would not produce results that would be meaningful. As noted above, EPA will work with ATSDR and the Butte-Silver Bow Health Department to conduct broader public health evaluations through the health department as needed.

- **Comment 64.4.** “Butte's health study is, again, not thorough. Mary Kay has asked for more than lead to be included. That is mercury, cadmium, arsenic, and their synergism with each other and with others, crystalline silica. It was named such in about 1996 by the International Agency of Research on Cancer, but EPA has chosen, for whatever reasoning, not to include it in risk studies for Butte. And so my wife, who has had both ovarian cancer, 1996, bladder cancer in 2017, perhaps the most vulnerable people of Butte because she was born and raised in Butte. Her mother died of bladder cancer. She believes Butte deserves a robust health study and ongoing monitoring. EPA can make that happen. Butte-Silver Bow can desist in its denigration of the independent health studies done by credible Ph.Ds over the years.”



**EPA Response.** The 2010 RMAP plan and its draft 2016 update include the contaminants of concern that were identified as the primary risk drivers in the 2006/2011 BPSOU Record of Decision. The draft 2016 RMAP plan provides new enhancements and data approaches. The 5-year medical monitoring studies were never intended to look at the entirety of chemicals of potential concern in the BPSOU; the studies were intended to look at contaminants identified in the human health risk assessments—lead, arsenic, and mercury. The medical monitoring studies have one chief mandate—to look at whether the RMAP is effective. As noted above, EPA will also work with ATSDR and the Butte-Silver Bow Health Department to conduct broader public health evaluations through the health department as needed.

- **Comment 78.2.** “Regarding health issues.... There clearly needs to be targeted on-going monitoring particularly in the folks representing the 40 to 80 year old cohort groups.”

**EPA Response.** Data will continue to be collected from pediatric clients within the health department’s WIC program and from other pediatric and adult populations who request testing at the health department, including aging and aged residents. The 5-year medical monitoring study process will remain focused on elevated lead because elevated lead is more prevalent in Butte than other contaminants, including arsenic and mercury. Since 2010, however, arsenic and mercury biomonitoring have been offered under the RMAP when environmental sample concentrations in soil or dust are high enough to warrant such testing, which is a rarity. Any arsenic and mercury biomonitoring data obtained moving forward will be used in future health studies.

- **Comment 80.4.** “I support the Health Study work and believe that the details will be worked out that will quantify and qualify the impact of the current situation and the success of the ongoing actions that will in the end improve public health and safety.”

**EPA Response.** Thank you.

- **Comment 96.5.** “2) Health Studies. The Proposed Plan should include clarity and direction for health studies, particularly regarding Minor Modification No. 11, which states:



“11. Better describe the mandate for future health studies. The 2006/2011 ROD requires future human health studies on a periodic basis but does not specifically describe their exact nature. The modification specifies:

- BSB County, in coordination with the Medical Monitoring Working Group, will periodically evaluate medical monitoring (i.e., biomonitoring) data approaches and data compiled under the medical monitoring program every five years for a period of 30 years. The first of these studies was completed and approved by EPA in 2014. Five additional periodic evaluations will be conducted over the next 25 years.
- Reports documenting these periodic evaluations will respect the personal privacy of the participants and will be available to the public, EPA, DEQ, and responsible parties for the BPSOU.
- All stakeholder parties will continue to facilitate, participate, and contribute with the Medical Monitoring Working Group. Butte-Silver Bow very much appreciates the inclusion of Minor Modification #11, and therein, EPA’s acknowledgement that the original Record of Decision did not specifically require human health studies. With this modification, EPA can now include the requirement specifically in the Amended Record of Decision. In response, Butte-Silver Bow acknowledges that the RMAP workplan is a fluid document and will continue to be revised as new information emerges.

“Butte-Silver Bow further understands that the language about “in coordination with the Medical Monitoring Working Group” is deliberate, due to the diverse expertise of the working group stakeholders. The language provides community health applications that EPA does not always have the authority to require. Butte-Silver Bow understands and appreciates the fact that the stated approach would allow each health study to evaluate health impacts beyond lead, arsenic, and mercury exposure and the medical monitoring associated with the RMAP program. The language in the Proposed Plan must be revised to provide better clarity and direction. Minor Modification No. 11 says that Butte-Silver Bow, in coordination with the Medical Monitoring Working Group, will periodically evaluate medical monitoring (i.e., biomonitoring) approaches and data compiled under the



medical monitoring program every five years. This language needs to be clear, defining Butte-Silver Bow's role and the role of the Medical Monitoring Working Group. "All stakeholder parties" also needs to be defined. Butte-Silver Bow believes there is confusion about who the "stakeholders" are in the current Health Study process, and who is responsible for public engagement, participation and process facilitation."

**EPA Response.** The 2010 RMAP plan and its draft 2016 update will guide the medical monitoring study process moving forward. As noted above, EPA's unilateral administrative order, which will require this type of study, will include more detail on what is required. The revised and expanded RMAP plan that will be required under the unilateral administrative order will further define the scope of this required study. As needed, EPA will work with ATSDR, Butte-Silver Bow Health Department, and Atlantic Richfield to conduct broader public health evaluations through the health department.

- **Comment 97.2.** "The Board of Health agrees with the health studies comments provided by Butte-Silver Bow, in that the proposed plan should include clarity and direction for the studies, given that the responsible parties, including Butte-Silver Bow and Atlantic Richfield, are responsible for carrying out the studies. Regarding that perceived need for enhanced clarity and direction, the Board of Health asks: What data have already been gathered? How are the data collected, coordinated, disseminated, and archived? How are the data turned into useable, actionable knowledge, and by whom?"

"The Board of Health does believe that health study processes should be designed as ongoing and begin shortly after the end of each five-year study cycle, not two to three years following each study. The Board of Health also strongly recommends that the medical monitoring working group process be open to the public with a robust public involvement component. Also, regarding the working group, the Board of Health seeks tighter definition – what exactly is the working group? Who are its stakeholders? Who serves on the group? To whom does it report? What does it actually do? Are there bylaws? And, again, are the workings of the group a public process? The Board of Health also believes that the health studies need to be more carefully branded, so that they are not confused with various other health studies, such as the community health needs assessments that



are conducted every three years by the Butte-Silver Bow Health Department and the local non-profit hospital.

“Since Butte-Silver Bow is a responsible party and partner in carrying out the studies, the board believes that the Butte-Silver Bow Health Department should be more strongly sanctioned to assist in steering the study process. For example, the proposed plan says that Butte-Silver Bow, in coordination with the working group, will periodically evaluate medical monitoring (i.e., biomonitoring) approaches and data compiled under the medical monitoring program, every five years. This language needs to be clear, defining Butte-Silver Bow’s role, and the Health Department’s role, and the role of the working group. Because the Board of Health is requesting a stronger role for the Health Department, and due to the department’s relative lack of resources, sufficient funding must be made available to the department for this effort and other health-related Superfund efforts.

“Along with Butte-Silver Bow as a whole, the Board of Health appreciates the inclusion of Minor Modification No. 11 and EPA’s acknowledgement that the original Record of Decision did not specifically require human health studies. With this modification, EPA can now include the requirement specifically in the Amended Record of Decision. The Board of Health acknowledges that the Residential Metals Abatement Program work plan is a fluid document and will continue to be revised as new information emerges. The Board of Health agrees that new and updated evidence needs to be incorporated as science advances.

“The Board of Heath further understands that the language in the modification about “in coordination with the Medical Monitoring Working Group” is deliberate, due to the potential diverse expertise of the working group stakeholders. The language provides community health applications that EPA does not always have the authority to require. The Board of Heath understands and appreciates the fact that the stated approach would allow each health study to evaluate health impacts beyond lead, arsenic, and mercury exposure and the medical monitoring associated with the RMAP program. The Butte-Silver Bow Board of Health thanks you for your time and attention related to these comments.”

**EPA Response.** The responsible parties—Butte-Silver Bow and Atlantic Richfield—are responsible for conducting the Superfund-



required medical monitoring studies. The responsible parties with EPA and Montana DEQ oversight will verify that there is clarity surrounding past study data and how those data inform current and future studies; how data have been and are collected, coordinated, disseminated, and archived; and how those data are leveraged into useful action. Once each medical monitoring study is published, work on the next study will proceed. The settling defendants will more tightly define what the Superfund Medical Monitoring Study Working Group is—who serves on this committee, how public input and insight are solicited and received, and how other elements central to the group are defined. Moving forward, the Butte-Silver Bow Health Department will be, along with Atlantic Richfield, sanctioned to steer the medical monitoring study process. Along with the county's health officer and RMAP personnel, other health department personnel, including a new clinical environmental health employee, will work to coordinate efforts under both the Superfund and health department processes. As noted above, EPA's unilateral administrative order, which will require this type of study and will include more detail on what is required, and the revised and expanded RMAP plan that will be required under the unilateral administrative order will further define the scope of this required Superfund study. As also noted above, EPA will also work with ATSDR and the Butte-Silver Bow Health Department to conduct broader public health evaluations through the health department as needed.

- **Comment 98.35.** “U. Page 19, Modification 11. The Proposed Plan provides a more-detailed description of the periodic health studies to be conducted under the 2006/2011 ROD, which specifies:
  - BSB County, in coordination with the Medical Monitoring Working Group, will periodically evaluate medical monitoring (i.e., biomonitoring) data approaches and data compiled under the medical monitoring program every five years for a period of 30 years. The first of these studies was completed and approved by EPA in 2014. Five additional periodic evaluations will be conducted over the next 25 years.
  - Reports documenting these periodic evaluations will respect the personal privacy of the participants and will be available to the public, EPA, DEQ, and responsible parties for the BPSOU.



- All stakeholder parties will continue to facilitate, participate, and contribute with the Medical Monitoring Working Group.” AR supports the clarifications to the timing, reporting and stakeholder involvement requirements of the health studies component of RMAP provided in the Proposed Plan.

“AR disagrees with public comments that seek to expand the medical monitoring purposes of the present health studies program as such an expansion would be beyond the scope of EPA’s CERCLA authority. As presented in the RMAP plan, the purpose of these studies must be clarified to provide for periodic evaluation of medical monitoring (i.e., biomonitoring) data, and not to describe public health studies or to conduct basic research into the impact of metals on human health.

“AR also requests that the Amended ROD clarify the purposes for conducting these periodic evaluations:

1. Because the state of the science related to collection and interpretation of biomonitoring data continues to evolve, it is appropriate to periodically evaluate the medical monitoring approaches used in RMAP to ensure that the biomonitoring data can and should be considered in assessment of the extent to which potentially harmful exposure to sources of lead, arsenic, and mercury contamination from historic mining in the community have been mitigated by the Amended ROD remedy.

2. Examination of the complete biomonitoring database every five years can provide valuable information with regard to exposure trends over time and in comparison to reference populations over the same time periods. Information and analysis supporting both purposes can inform potential improvements to RMAP routine activities as needed to ensure the Program’s continued effectiveness and efficiency. For example, while RMAP has focused on arsenic, lead, and mercury, lead has proven to be the primary metal for which abatement actions are completed, and is the only metal routinely included in biomonitoring. Thus, periodic evaluations going forward under the Amended ROD should focus on lead. Similarly, future periodic evaluations should continue to focus on affected and sensitive populations as described in the RMAP plan.”



**EPA Response.** The medical monitoring component of the RMAP is primarily focused on lead as this was the primary risk driver identified in the human health risk assessments for the BPSOU site. The population of key concern for lead exposures is children; thus, by monitoring blood lead levels in children, the RMAP is focusing both on the primary contaminant of interest and on the key population of interest. Monitoring blood lead levels provides a direct and stable measure of total lead exposures across all potential contamination sources, including those that are site-related (e.g., soil, dust, air) and those that are not site-related (e.g., water, food, paint). In addition, because blood lead levels are commonly measured in children nationwide, it is possible to make comparisons between blood lead levels for children in Butte and children outside of Butte to inform decisions about the efficacy of the remedial action.

The RMAP and its medical monitoring study is focused on monitoring and evaluating the effectiveness of the Superfund remedial action. ATSDR can work with state and local health departments to conduct site-related public health assessments to better address general public health concerns regarding community health and disease rates for Butte if needed. As noted above, EPA will work with ATSDR and the Butte-Silver Bow Health Department to conduct broader public health evaluations through the health department as needed.

EPA understands the community is interested in expanding future health studies to include other chemicals and age groups. As stated in the 2006/2011 BPSOU Record of Decision, lead, arsenic, and mercury were identified as the contaminants of concern for the BPSOU. The site risk assessments evaluated other metals, such as cadmium, and did not find these to be important contributors to human health risks. Thus, inclusion of other contaminants, beyond lead, arsenic, and mercury, in the RMAP medical monitoring study is beyond the scope of the Superfund remedy. As noted in the 2014 Butte Silver Bow public health study, since 2010, arsenic and mercury biomonitoring have been available under the RMAP when soil and dust concentrations are sufficiently elevated to warrant testing. However, environmental concentrations were seldom high enough to offer such testing, and remedial actions have rarely been prompted due to arsenic and/or mercury alone.

In October 2019, ATSDR released *Health Consultation for the Exposure Investigation (EI) of Blood Lead and Urine Arsenic Levels*



for the Anaconda Smelter Site. The exposure investigation concluded that urinary arsenic levels for residents of Anaconda participating in the study are comparable to the U.S. population. Soil concentrations of arsenic in Anaconda are much higher than in Butte. Thus, because urinary arsenic levels are not elevated in Anaconda, this suggests urinary arsenic monitoring in Butte would likely show similar (or even lower) results as compared to Anaconda.

Nevertheless, EPA will consider the community feedback represented in this comment and weigh the potential merits of expanding the health studies program for the contaminants of concern identified in the BPSOU ROD with the stakeholder group that directs the periodic health studies.

EPA agrees that additional clarity is needed to better define the scope, objectives, roles and responsibilities, and interpretation of the future health studies. EPA also looks forward to continued discussion with the community, local health department, and project stakeholders on this topic. Specific details on future health studies will be documented in the 2020 BPSOU Record of Decision Amendment and will be further defined in a revised RMAP work plan that will be developed under the authority of the existing unilateral administrative order.

## **2.18 Impacts to Butte-Silver Bow Compliance**

### **2.18.1 Comment Summary**

One comment addresses Clean Water Act compliance impacts to current and future municipal wastewater collection, treatment operations, and discharge permit compliance and the impacts historical mining waste may have on those municipal functions. The comment was provided by Butte-Silver Bow County.

- **Comment 96.6.** “Of equal importance to Butte-Silver Bow is the alignment of the CERCLA-driven provisions under a BPSOU Consent Decree related to water quality on Silver Bow Creek with the Clean Water Act-driven regulations related to water quality on Silver Bow Creek and the Upper Clark Fork Basin. Butte-Silver Bow cannot be obligated (as a Superfund PRP/Settling Defendant) to perform under CERCLA without assurances that it will not create untenable obligations under the Clean Water Act, for example, long-term compliance with our municipal wastewater discharge permit, Total Maximum Daily Limits (TMDLs), and Municipal Separate Storm Sewer Systems (MS4) permit coordination. In particular, it is clear



that Butte-Silver Bow’s municipal wastewater treatment plant plays a significant role in the overall collection and treatment of storm water (e.g. inflow and infiltration), and by extension, the metals removal challenges on Silver Bow Creek. The Agencies and settling defendants are all in agreement that a clean creek is the end goal, but beyond its recent \$34 million plant upgrade, Butte ratepayers cannot be expected to absorb any additional costs to address metals removal (e.g. tertiary metals treatment on its WWTP, expedited replacement of sanitary collection system, etc.), or be forced to demand unreasonable pretreatment requirements on potential users of the wastewater system. Thus, the Proposed Plan and CD must consider potential impacts to current and future municipal wastewater collection, treatment operations and discharge permit compliance.”

#### **2.18.2 EPA Response**

EPA has encouraged dialogue between Atlantic Richfield and Butte Silver Bow County regarding impacts from historical mining waste on the municipal wastewater treatment system. EPA has also coordinated with Montana DEQ on the unique interaction between the CERCLA stormwater requirements defined in the expanded remedy reflected in the 2020 Record of Decision Amendment and the county’s current state stormwater permit. These efforts have resulted in the necessary actions to address the county’s concerns in EPA’s view.

### **2.19 Operable Unit Management**

#### **2.19.1 Comment Summary**

Two comments were received regarding the management of the BPSOU and the larger Silver Bow Creek/Butte Area site, urging EPA to consider the other operable units within the Silver Bow Creek/Butte Area site and coordinate cleanup actions as a whole.

- **Comment 8.9.** “The proposed plan, the upcoming ROD, and the CD that follows constitute major achievements for all of the negotiating parties, all of whom have finally engaged in a serious give and take to come to this point. But, as complex as this process has been, it’s only part of a larger, more complex NPL site. Like all other Operable Units for the Silver Bow Creek / Butte Area NPL site, the plan for BPSOU suffers from its isolation from the other parts of the overall site: aside from the mandated five-year reviews, the Superfund process for this NPL site is fragmented across different OUs and there’s virtually no comprehensive overview provided that acknowledges the



interconnectedness of all the OUs. This shortcoming requires management oversight and communication strategies that so far have not been developed or implemented. This is relevant not merely to BPSOU, but to the whole site, and it's a shortcoming that needs to change."

- **Comment 96.8.** "4) Coordination between Operable Units: Priority Soils and Mine Flooding. There needs to be greater recognition that Horseshoe Bend Effluent (via the Mine Flooding Operable Unit) will eventually be part of the mix in terms of water quality and metals compliance on Silver Bow Creek, as well as potential beneficial uses of that water for the community. Another beneficial input to Silver Bow Creek could be flow from the Silver Lake water system. Butte-Silver Bow has already taken steps (through formal change proceedings with DNRC) to allow the use of its existing water rights to augment flow in the area as part of a holistic solution that includes both Silver Bow Creek and WWTP discharge compliance. The Priority Soils Proposed Plan and Consent Decree needs to better address the need for coordination between and among final decisions between with Mine Flooding."

#### 2.19.2 EPA Response

EPA and Montana DEQ are carefully evaluating the treated water discharge from the Butte Mine Flooding Operable Unit into Silver Bow Creek and are aware of ways it may affect water quality and performance standard compliance in BPSOU. Whatever enforcement mechanism that EPA uses to implement the BPSOU ROD will include requirements for plans to evaluate water quality compliance that will take into account scenarios with and without additional discharge from Butte Mine Flooding. Operable Unit. However, the BPSOU remedy has to be protective without relying on discharge from Butte Mine Flooding, which may be intermittent until the eventual closure of active mining, which could be decades in the future.

EPA will review all Butte Mine Flooding remedial design plans and verify coordination between the two operable unit remedies. Many of those plans currently account for coordination with the downstream operable units within the Silver Bow Creek/Butte Area site through evaluation of scaling, temperature, volume, and water quality, to name a few of the factors that EPA requires be evaluated.



Additionally, EPA and Montana DEQ also work internally to verify coordination and consistency among all of the Silver Bow Creek/Butte Area operable unit response actions. The same EPA remedial project manager and state project officer for EPA and Montana DEQ, respectively, work on Butte Mine Flooding, BPSOU, West Side Soils Operable Unit, and Rocker Timber and Framing Treatment Plant Operable Unit. EPA sponsors an annual day-long event put on by the U.S. Geological Survey that presents data from a sitewide perspective (the U.S. Geological Survey collects surface water data throughout the collective Clark Fork Basin Superfund sites, using funding provided by EPA). The event is open to the public and tracks overall sitewide progress.

## **2.20 Proposed Modification of the 2006/2011 Record of Decision**

### **2.20.1 For Proposed Modification**

#### **2.20.1.1 Comment Summary**

Twenty-four comments were received that expressed support for the changes as described in the proposed plan.

- **Comment 3.1.** “I spent the better part of my twenties promoting Butte. I think getting the remediation wrapped up in Butte would be a massive benefit to the town and community. Butte is ready to push forward and rise up from its past. I think because remediation is a slow process it's hard for people to see the impact that has already been made on Butte. As a photographer I see that change year over year. I've seen elk in environments that used to be wastelands. I've seen the Butte hill covered in grass whereas 10 years ago, it was bare. Slowly, but surely each year Butte is getting greener. I think this project could be the finishing touch that Butte needs to finally move forward, contributing to the future that the people of this amazing town deserve.”
- **Comment 4.1.** “In general, the proposed plan is a positive Superfund development for Butte. The Proposed Plan, along with the previously announced conceptual agreement, goes beyond what can strictly be mandated under Superfund. The section announcing the expansion of the RMAP program is a particularly positive development.”
- **Comment 5.1.** “After many years of negotiations between the potentially responsible parties and considerable public input at many stages of the process, I believe the proposed plan indeed meets most of the goals of protecting the environment and assuring the best cleanup possible of the Butte Hill and upper Silver Bow Creek area.



... I believe that while this cleanup and many restoration "extras" that will come as part of the final work plan will not satisfy every resident, this is indeed the best solution that will produce the best outcomes for the community at large and leave a legacy that we can be proud of."

- **Comment 7.2.** "There are two overarching concerns I have about cleanup plans that are not adequately articulated in this amendment:

First, the low-income people living in substandard old rental housing on the Butte Hill: Please use your legal power to assure your Environmental Justice obligations to these vulnerable people are fulfilled by giving them the ability to request Residential Metals Abatement Program inspection and, where needed, cleanup of their yards and attics without having to go through the reluctant landlords or owners. The Butte Hill comes up in red on your Environmental Justice screen. You have the responsibility to assure the poor in Butte get the same quality cleanup as others throughout the city.

Second, Butte's future people: Please make certain that, when mining ends in Butte 30 to 50 years from now, Silver Bow Creek is once again connected to its original East Ridge headwaters sources, as a natural meandering stream. Future Butte residents must not have to endure a dead or impaired creek, and thus stagnant economy, as my generation did.

This is a one-time deal: your decisions today will affect the environmental and subsequent economic opportunities of Butte people in perpetuity. Please make them the focus of the best cleanup you can obtain. My comments are categorized for your convenience. These are personal BPSOU concerns that remain after my 28 years of either employment or volunteer advocacy on Superfund issues in Butte -- with the Clark Fork Coalition, Citizens Technical Environmental Committee, Citizens for Labor and Environmental Justice, and Restore Our Creek Coalition, the latter two organization I helped found."

- **Comment 8.2.** "The proposed plan includes a number of compromises that many people are unhappy about—the high-flow waiver of Montana's water-quality standards, and the removal of an option for active water treatment facilities, just to name two. But compromises were to be expected in a negotiated settlement. However, even if we accept certain compromises, I'm convinced that



some features of this plan will fail to win widespread community acceptance unless the plan—and subsequent decision documents—addresses several problems in the plan as published. ... The proposed plan to modify the BPSOU ROD is not perfect. It doesn't include everything that I would have called for if I were emperor. But if it's carried out successfully, and if the proposed modifications that emerge from the community during this public comment period are incorporated to some degree, I'm convinced that it will leave Butte a healthier, cleaner, more livable, and more attractive place to residents and visitors alike. I look forward to seeing the plan implemented, the cleanup and restoration work completed, and the city made a better place for all of us."

- **Comment 12.1.** "Like thousands of Butte kids, I vividly remember bathing in brown water. I remember large barren swaths of fenced-off, oddly colored land. Superfund investment has dramatically transformed the environment of Butte over the last few decades, and the agreement at hand will further improve the environment of Butte and the quality of life of its residents. I support the proposed plan and look forward to its implementation. The proposed plan would amend the 2006/2011 record of decision to, among other things, increase removals of near-stream mine waste, construct storm water collection basins, expand groundwater capture areas and reroute part of Silver Bow Creek. I am proud of the local activists that have shaped the process in recent years. I am even more proud of the civil servants of our community who have worked tirelessly to bring this agreement to a positive conclusion for the prosperous future of our town. I have the following specific questions and recommendations: [addressed in various section of this document]. ... In conclusion, the proposed plan describes a laudable vision for cleanup of Silver Bow Creek and the Butte Area Superfund Site, and fulfilling its vision will take smart planning, sustained investment in science, and coordinated monitoring and adaptive management. The proposed agreement, if approved, presents a once-in-a-lifetime opportunity to put Butte on a path to long-term environmental and economic prosperity. I look forward to seeing it become a reality"
- **Comment 15.1.** "I wanted to voice my support for the Proposed Plan for the Amendment for the BPSOU ROD. As being an active part in collecting and analyzing data, evaluating alternatives for over 20 years at BPSOU on behalf of Atlantic Richfield, I'm a past resident of Butte,



and have family and great friends still living in this wonderful area...I still own property in Butte, so I do feel I have a vested interest in how the BPSOU remedy plays out.”

- **Comment 17.1.** “After reading the proposed plan to amend the 2006/2011 ROD; having lived and worked in Butte most of my life, and seeing the impacts of the remediation thus far. I feel very confidently that the proposed decisions, as they apply to the capture of contaminants, are in line with a strong reduction in the impact of mine waste within the BPSOU area. I have seen an increase in water fowl, aquatic life and fauna in the areas remediated to date. Mining has impacted Butte and its residents in so many ways, both good and bad. But without the mining there is no doubt that I would never have lived in this beautiful area. The conversation, and continual cleanup of our superfund site will likely last for many years, but I do see that what has transpired has been for the good of the area and those who call Butte “home”. The addition of the “pleasant and public accessible” catch basins will both enhance and continue to renew our town, and without doubt serve to be a pleasing byline in the many travelers’ stories of their visit to the “Richest Hill on Earth”. I appreciate the efforts of those who continue to work side by side in the difficult task of decision and execution of the plans to renew and refresh this community. Thank you for your time and attention to this matter.”
- **Comment 18.2.** “I have had the unique opportunity of having witnessed huge tracts of lands transformed from moonscape into recreational areas. To be able to walk from the trailhead from Wyoming Street past the MT. Con and through the Foreman’s Park all the way up to the hallowed ground of the Granite Mountain/Speculator Mine Memorial is something in the mid 90’s that I never could have dreamed of. Today I walk this trail almost daily with my wife. To be able to ride our bikes from Butte to Rocker and on to Ramsey was again something I never could have imagined. Today we do this as often as possible on weekends. The bridges you have built. The tunnels and paved trails. The reclamation. The carefully placed storm water pathways and so much more. All of these elements have only increased my love of place. The many levels of planning and work has not gone unnoticed by me and I am very appreciative of the great effort behind them all. I have seen conceptual videos and architectural renderings of your proposed remedy and I



stand in amazement and filled with great excitement for the future. I support your vision. A vision shared by many through public input. I want to thank you all for everything you have done to make Butte a far far better place to live, raise children, recreate and for giving me so much pride and hope for this great place I call home.”

- **Comment 22.1.** “The Citizens Technical Environmental Committee (CTEC) prepared these comments on EPA’s April 2019 Proposed Plan to Amend the 2006/2011 Record of Decision Butte Priority Soils Operable Unit (Proposed Plan). CTEC recognizes that the Proposed Plan is a significant decision point for Butte Priority Soils (BPSOU) because it is the basis for the Consent Decree which will determine the details, performance standards, and legal responsibility for the final cleanup of Butte’s urban core. CTEC is pleased that the settling parties have made good progress towards an agreement and that a final CD is within reach. The following comments [addressed in various sections of this document] describe our opinion of the Proposed Plan and what additional factors we believe need to be addressed in the final amended Record of Decision.”
- **Comment 25.1.** “Trout Unlimited offers the following comments on EPA’s April 2019 Proposed Plan on behalf of our nearly 2,000 members in the Clark Fork Basin. Trout Unlimited is actively engaged with a variety of partners to conserve, protect and restore the Clark Fork River and its fishery. The long-term health of the Clark Fork River and the success of restoration downstream depends on an effective remedy in Butte. The Proposed Plan offers a significant step forward towards effective cleanup on Butte Hill and protection of water quality in the Silver Bow Creek headwaters.”
- **Comment 26.1.** “I write on behalf of my role as a citizen of Butte – Silver Bow County, after my review of the Environmental Protection Agency’s (EPA’s) proposed plan for the Record of Decision (ROD) amendment for Butte Priority Soils Operable Unit in Butte, Montana. I will keep my comments brief. I find the material and plans outlined in the proposed changes to be scientifically credible, feasible, and appropriate for the conditions of concern. I trust that the EPA, along with the related responsible parties, will stay up to date on the environmental conditions and related remediation, particularly as they pertain to the advancement of knowledge, science and/or technology and/or additional discoveries that are currently unforeseen.”



- **Comment 30.2.** “Overall, I am in favor of the plan as proposed. I look forward to a state of the art storm water treatment with the amenities as put forth in the proposed plan. There are some exceptions, however, as noted below: [addressed in various sections of this document].”
- **Comment 32.1.** “I am writing this letter today to support the Butte Priority Soils Operable Unit Proposed Plan. After hearing a presentation from Butte Silver Bow County officials, I am convinced this plan is the best solution for our community and it must be approved as soon as possible. Our community deserves this work and we shouldn’t have to wait any longer. The plan is thorough, thoughtful, and helps this area get de-listed from Superfund, which we need desperately. I am pleased to see the proposed plan prioritize public health and our environment, hand in hand. Butte has struggled to grow and as someone in local advertising, our Superfund listing and history has been a burden on me and my company to grow here as well. Economic development is vital and approving this plan with all parties working together will help our community begin to prosper like others in our state. Expanding the RMAP program will serve the community well. We have promoted this at our station and I’ve seen excellent results from their work. The end land use proposals will be enjoyed by the people of Butte and visitors for years to come. Thank you for your support of Butte and be aware that we are excited to see the progress continue with this plan!”
- **Comment 37.2.** “FWP is supportive of all proposed ROD amendments that would further eliminate or improve control of contaminants reaching surface waters. This is of fundamental importance to the health of the biological community in Silver Bow and Blacktail creeks. We do request that EPA coordinate with FWP during instream waste removals or channel relocations that could lead to direct fish mortality (primarily through stream dewatering). Through coordination it may be possible for FWP to assist with a fish rescue in affected reaches. In the event that FWP is unable to assist, we strongly recommend that EPA or its cooperators perform a fish rescue to the best of their ability. Fish captured in such an effort should be placed above or below the affected reach in an expedient manner.”
- **Comment 40.1.** “The focus of my comments this evening is on this proposed remediation plan. I don't want to get into restoration or what



could be added to this plan later on. I say this deliberately because one of the things that, maybe by teaching public administration and public policy, is that agencies are limited in what they can do by the law. And very often an agency may like to do something, may consider something beneficial, but they simply cannot do it under existing statutes or existing policy. I know a very competent environmental attorney with the State of Montana told me once that anything EPA does we have to consider it as being eventually justifiable if it's challenged in court. And that can limit what an agency can do. And so, perhaps, somewhat surprisingly, I have to say that I'm very supportive, or generally supportive, of this proposed plan.

“And so, it's not perfect. It can be improved. Later on, we will need to address the issue of things like Restore Our Creek and see how that can be entered into this plan. But, as the common saying goes, that the perfect cannot be the enemy of the good, I think if you compare this proposed plan to where we were ten years ago, we have made some significant progress. In short, then, you know, I know there are limitations to what the proposed plan is going to do. But I think if you compare where it will take us -- and there's a lot, yet, to be done; namely, a consent decree. And one thing I think I want to address some may find offensive. We should really hope that we get the consent decree. Because I can tell you, based on my reading of the law, based on my investigation of other sites, there is a lot in the consensual agreement, there is a lot in the consent decree that the EPA could not order on its own, that if we had to go to a unilateral administrative order, a lot of the amenities, a lot of the cleanup that we are going to get if we get this consent decree would not be available. That's not a threat. Nobody's been threatened that if you don't agree to the consent decree we're going to take this away. It's a statement of fact, that there are limits in law to what EPA can order, and there's a lot more in that consent decree than EPA can order. Just as the RMAP program, which is a nationally recognized lead abatement program, addresses lead paint. Lead paint is not part of mine waste; yet, ARCO agreed that it would be included. If EPA had had to order something like this under a unilateral order, that probably would not have been in it. But, I think, looking at the proposed plan amendments as written, that it does represent substantial progress, the consensual agreement represents, you know, substantial progress. There are things in that that ARCO, for example, would not, under



Superfund law, be required to do. And while it's not perfect, I think it does represent an advance over where we've been.”

- **Comment 54.2.** “My personal opinion is I stood here in this room 15 years ago and railed against the EPA for their proposed plan at the time. And I did that because I was innately familiar with the data that the original proposed plan was based on. And I thought it was a joke. Today, I feel differently. I'm not here to rail against this proposed plan. I've looked at every major document that's come out of the Superfund process in the last 15 years. Some of them I've felt worse about, but I noticed a change in the EPA's language and position in recent years. The first time I saw it I was really surprised. I reread the page a few times because I was, like, "Wow, they're actually, they're actually on the same page as we are." I'm not sure if they had come to our conclusion or we had come to a joint conclusion. But it marked a significant change in EPA's stance towards Butte as far as I was concerned.

“I know a lot of people are focused on the creek, Upper Silver Bow Creek, and whether it will be restored to a flowing meandering channel. And I am in no way here to disparage that dream. I think it's a good idea. But when I look at the proposed plan, although I do realize that is absent, I see a lot of good things in it. In fact, I see just about everything that we were fighting for 15 years ago in this proposed plan. In addition to that, I see solutions for problems that have been identified in the last 15 years. A lot of hard work has gone into studying the Superfund in Butte since the original proposed plan. At this stage I'm surprised we even had a proposed plan and ROD when we did, because we really didn't know half the story. Both the State and EPA and ARCO have spent a lot of time and money studying this site since then, and that information was critical to identifying further problems. So I guess that's -- when I look at the proposed plan, I see a plan that I think Butte should be happy with.

“But I would like to, also, talk about groundwater because I'm a hydrogeologist, and I was part of the "Parrot Wars" you might say. And I was on the State side of the Parrot Wars. But the way that EPA addressed the Parrot plume in the first place is they said, "Even if you remove everything you can, it's going to take a long time for this aquifer to clean up." And I can't disagree with that as a hydrogeologist. But they went on to say -- first of all, they said, "We're going to waive that groundwater in the alluvial aquifer." That stand -- those standards



are waived, too. But they said, "If groundwater is affecting Silver Bow Creek we'll do something about it." And we're at that point now. And not only are we at that point, we understand a couple of locations where groundwater is specifically affecting the stream. And those are now being addressed under this proposed plan. ... So I guess that's -- I'm pretty much a proponent and very pleased of this proposed plan. Thank you."

- **Comment 56.1.** "I, too, am well pleased with the proposed plan with this caveat. No legislative enactment, no law, no program conducted by the government can go beyond what is mandated by law. There are things that people might like to see happen, that people think ought to happen, but it has to confirm -- conform to the parameters of the law. And, given that, I think that the proposed plan, actually through mutual consent, goes far beyond what EPA could order the principal, the potentially responsible parties, to do. And for that, ARCO, for example, has gone the extra mile in a number of the provisions in this proposed plan. But my point is that you have to consider what can be ordered and what can't be ordered by EPA. ... And, anyway, those are the specific concerns I'd like addressed. But, generally, I'm supportive of the program because I think it goes far beyond what could be ordered under the law."
- **Comment 65.8.** "I also encourage the public to listen to those scientists and engineers. A lot of us are quiet in the room. A lot of us have ties to these organizations and we can't get up here and comment. I can. I don't have any ties. But there are people in this room that will talk. I understand. I will encourage the public to listen to those folks. They're subject matter experts, and they've devoted their lives and career to the successful cleanup of this community. I would ask the public not to fall victim to what I consider to be factually incorrect claims that we're getting screwed as a community. Streams used to run red and orange here. Copper concentrations are two orders of magnitude above where they are today. Parts per billion is what we're discussing now and getting the -- to put that to layman's terms, that is two teaspoons and 2.1 million gallons of water that we're discussing, just to make it clear.

I want to thank DEQ, EPA, ARCO BP, their contractors and consultants who have gotten us this far. I know it goes thanklessly sometimes. And you sit in cubes and think for hours and try to figure things out. But your work is appreciated. We thank you for getting



Butte where we are. And, lastly, in the spirit of proper negotiations etiquette, that our community and our coalitions offer concession in the negotiation. I don't see that we've moved very much. And I see a lot of offers and offers and offers and, really, no movement on our part. I think we should accept the plan as offered with the comments that were all submitted tonight, and proper address to everything that was submitted, and make sure that we move forward as a community. e today, which is copper concentration is 100 times less than pre-CERCLA, which I can't factually say we have not had progress in Butte.”

- **Comment 80.1.** “I am honored to contribute my personal support for the Butte-Silver Bow 2019 BPSOU ROD Amendment. Until becoming a B-SB Commissioner in 2017, I was not actively involved in the Superfund Activities that are critical to the long-term health and safety of the current citizens and the future generations of B-SB residents. I’m a lifelong resident of Butte (Born 1952), the son of parents who also were lifelong residents. As a youth, I grew up in the Emerson School area and the “Diggins” was one of our play areas for bike riding and digging underground clubhouses. We were always warned by our parents to avoid going anywhere near “Copper Creek”, an industrial drainage ditch, now known as “Silver Bow Creek above its confluence with Blacktail Creek”. I did catch fish in Blacktail Creek during the same timeframe.
  - I support EPAs proposed modification of the surface water remedy.
  - I believe that during the design and operation phases, the remedies will be tuned and improved to water quality of the surface water.
  - I support all of the “Minor Modifications”. Particularly the additional points of compliance which will further define the current and ongoing change in the COCs.
  - I believe the tuning of the Health Study to better define and track the health of B-SB residents. I believe the action Lead levels need to be matched to other Federal agencies to allow our monitoring to match those needed by other Federal agencies to allow funding of projects in B-SB.

I am not enough of a Pollyanna to believe that the actions to be taken will fix this issue immediately but see it as a major step



toward addressing the problem that can be improved and modified incrementally to finally achieve a resolution for current and future generations. I thank all of the folks, Agencies & PRPs, for their hard work and diligence in reaching this amendment to the ROD.”

- **Comment 91.11.** “All said, I appreciate what has been proposed in the Plan and believe it will enhance livability in Butte. I am cautiously supportive but believe more specifics should be made available to the public before the final Plan is adopted. The Community has been patient and engaged, and deserves a thorough clean-up.”
- **Comment 96.3.** “Regarding the integration of the remedy with restoration work and end land use components, BSB appreciates the cooperation of all parties to design and produce a first-class outcome as well. The remedy work alone calls for improvements to the existing vegetative caps and addressing unreclaimed areas on the Butte Hill. In addition, maximum tailings removals (out of groundwater’s way), state-of-the-art storm water retention facilities, total reconstruction of the last section of Blacktail Creek (by the Visitor’s Center) to its confluence with Silver Bow Creek, and then past the confluence, reconstruction of a meandering stream (where the BSB asphalt plant sits today) and relocation of Silver Bow Creek from between the slag canyon walls to connect with the remediated and reconstructed Silver Bow Creek to the west (see conceptual design graphic). Added to all this work is the State’s critical project to remove the Parrot Tailings and restore the east end of the corridor for beneficial uses. Butte-Silver Bow, as a partner in developing the workplans, fully supports those projects outlined in the Proposed Plan, and in addition, how all this work has been designed to blend into 120 acres of attractive, useful, public open spaces and recreation opportunities throughout the Silver Bow Creek corridor. The project plans are designed with an eye to the future, when identifiable water sources become available as a headwater to source Silver Bow Creek from Texas Avenue/Civic Center to the confluence with Blacktail Creek. The comprehensive proposal will build on Butte’s track record of getting quality end land uses as a result of environmental cleanup and restoration projects, for example, the Silver Bow Creek Greenway, the Visitor Center/Chamber Offices, Granite Mtn. Memorial, Blacktail Creek Trail, Big Butte Open Space, Copper Mtn. Complex, BA&P Trail, MT Con/Foreman’s Park, Original Mine, Thompson Park upgrades, Skyline Park, Miners Field, and much more. The Silver Bow Creek



corridor will be first-rate and impressive community asset. Although Butte-Silver Bow supports the Proposed Plan, it offers the following specific comments to ensure the Proposed Plan is responsive to the public's concerns, interests, and desires pertaining to public health, the environment, and Butte-Silver Bow's municipal obligations related to remedial work [addressed in various sections of this document]."

- **97.1 Comment.** "The Butte-Silver Bow Board of Health wishes to provide comments on the proposed plan to amend the 2006/2011 Record of Decision for the Butte Priority Soils Operable Unit. The board is supportive of the proposed plan."
- **Comment 98.2.** "OPENING STATEMENT IN SUPPORT OF PROPOSED PLAN Atlantic Richfield Company (AR) supports the Proposed Plan to Amend the 2006 Record of Decision (2006 ROD) and its 2011 Explanation of Significant Differences (2011 ESD) for the Butte Priority Soils Operable Unit (BPSOU) of the Silver Bow Creek/Butte Area Superfund Site (Proposed Plan). The Proposed Plan was issued by the U.S. Environmental Protection Agency (EPA) on April 11, 2019, for public review and comment. As an initial matter, AR would like to thank EPA for the work it has put into overseeing implementation of significant elements of the remedial work at the BPSOU to date. AR commends EPA's efforts over the past thirteen years to carefully evaluate site conditions and data regarding the performance of the existing remedy components, and to consider input from AR and other stakeholders to identify necessary modifications and improvements to the 2006 ROD. The Proposed Plan will improve remedy effectiveness and permanence and will further protect community health and the Butte environment going forward. This evaluation required EPA and other stakeholders to analyze complex technical and regulatory issues associated with this unique site, which was a challenging and difficult endeavor. The Proposed Plan builds and improves upon the response actions that have been implemented at the BPSOU over a period of 30 years. These previous remedial actions, which are described and documented in the 2006 ROD and the 2011 ESD, have significantly improved human health and the environment in Butte. The data and experience gained during these previous actions has now been used by EPA and other stakeholders to develop final remediation plans for surface water and other environmental media at the BPSOU. AR believes that the



modifications identified in the Proposed Plan—coupled with the extensive work done to date—will result in a final cleanup for the BPSOU that will remain protective of human health and the environment in the future.

AR's support for the Proposed Plan is conditioned upon its ability to reach agreement with other parties—i.e., EPA, the State of Montana (State), AR, Butte-Silver Bow (BSB) County, and potentially other responsible parties—in a final Consent Decree (CD) that would implement the actions identified in the Proposed Plan. In addition to the work described in the plan, the CD would include certain restoration actions coordinated with the remedy that would be performed by the State; proposed end-land-use commitments by the CD parties; releases of liability, covenants not to sue, and reservations of rights for and by all CD parties; and agreement upon the criteria and methods for assessing remedy performance. Under a final CD that is acceptable to all parties, AR would commit to fund and carry out certain activities described in the Proposed Plan that EPA could not unilaterally order AR to perform under CERCLA, the National Contingency Plan (NCP) and other applicable laws, including: rerouting part of Silver Bow Creek (SBC) out of Slag Canyon and into a newly constructed channel that is not in contact with contaminant sources at the Butte Reduction Works (BRW); construction of large-scale systems to control and treat stormwater runoff from the City of Butte, and associated excavation of both mining and municipal waste in the stormwater basin area; significant expansion of waste removals in the SBC and Blacktail Creek corridors; and other actions to improve water quality in and habitat surrounding Silver Bow and Blacktail Creeks, among other things.”

#### **2.20.1.2 EPA Response**

The comments supporting the changes to the remedy as described in the proposed plan are acknowledged by EPA and noted for the record.

### **2.20.2 Against Proposed Modification**

#### **2.20.2.1 Comment Summary**

Six subcomments were received as part of larger comment submissions (three from one commenter) that were against the modification of the remedy itself and not a specific portion of the modification as described in the proposed plan. Those comments are shown below. Comments that



opposed specific portions of the proposed plan are addressed elsewhere in this document by topic.

- **Comment 2.1.** “The proposed decision on Butte Priority Soils Operable Unit by the Butte Silver Bow Local Government, the EPA, the State of Montana and ARCO is a bad decision! Not restoring Butte’s portion of Silver Bow Crick to a quality creek where children can fish and play is unconscionable and an irresponsible decision! The decision is the final decision for the Butte Superfund area and it along with the Berkeley Pit and Montana Pole decisions will have forever-negative environmental, economic and social consequences for Butte Montana! Lowering the discharge standards to the Creek is even more unbelievable! 2.11. Everyone knows, including the EPA the State and Arco/BP, using good science that is now available because of research by the Butte Natural Resource Council that was not available prior to the 2006 Record of Decision, what needs to be accomplished to have a responsible cleanup under Superfund law. We deserve a solution that requires a cleanup and restoration that is protective of human health and the environment and the Montana Constitution that protects waters of the State--- No more deals, no more band aids! Two basic premises were used in making this unsatisfactory and what I call incompetent decision on the cleanup of Silver Bow Creek at its headwaters. #1 it was based on the fact that Silver Bow Creek flowing through Butte was sewer, and #2 it was based on the fact that it was technically impracticable to responsibly clean and restore the Creek and its corridor and to leave contaminated “waste in place”. Both of these premises have now been proven to be totally false and inaccurate! ”
- **Comment 36.3.** “You have the ability to do what is "right" and make decisions that you would expect and demand if you lived in Butte. Please re-consider and DO THE RIGHT THING WITH A TIMELY, COMPLETE CLEANUP and RESTORATION OF BUTTE and ANACONDA.”
- **Comment 41.2.** “For the record, just let me say that the Proposed Record of Decision Amendment on Butte Priority Soils is a bad decision. The agreement, in principle, was a bad decision. And the 2006 Record of Decision was a bad decision. They were all based on totally false and inaccurate information. And, again, the new amendment is still faced with that inaccurate and incomplete information. I can say for myself, without hesitation, that, once again,



the Butte-Silver Bow local government who -- I have great respect for the people within the government. And I like to say that because I know they're good people and trying to make some right decisions. But I believe they're headed down the wrong path on this particular one. And including the EPA and the State of Montana. They've totally failed our community. That's what they've done on this decision and on their last decisions. And they've done that by not providing a quality cleanup and restoration that the people of Butte deserve and we need and we're entitled to under Superfund law, State law and the Montana constitution.”

- **Comment 48.1.** “I'm a Butte native, 64 years. I was born and raised in McQueen. A number of you people probably don't even know where McQueen was because now it's buried under tons of ore. But I just want to come up and say "ditto" to what Fritz Daily has said. We deserve better and we deserve the best. Because we started this thing, and it's now ending here, but it should have began here 20 years ago. It should never have started down in Missoula. But it should have started here, where the mining began, and the cleanup should have worked from here and flowed down. And, Sister Mary Jo, you're correct, Butte-Silver Bow Creek is what we should have.”
- **Comment 58.2.** “I offered testimony back on April 23, the last public hearing, and I've also submitted written testimony to my strong opposition to the Proposed Record of Decision Amendment by the EPA, the State of Montana, the Butte-Silver Bow local government, and British Petroleum/ARCO. I'm going to reiterate a few things I said at the last meeting because I realized that there are people here tonight that weren't here when I had my opportunity last time. For the record, just let me say that this proposed decision on the amendment on Butte Priority Soils, it's a bad decision. The agreement in principle was a bad decision. And the 2006 Record of Amendment, the Record of Decision, was also a bad decision.”
- **Comment 66.1.** “Thank you, Patricia. I understand that's going; is that correct? Thank you. So, they're working with us on that whole area. Now, what we need to do is truly find a way to bring the water back. And we say, "Is there water? Yes, there is." The polishing plant is going to do what to the pit water? We hope it's going to clean it. And we hope that water is going to be put down. We hope that water will be put into the stream so that it will flow down on through. Because what they did to the metro storm drain was from the north side of the



Continental Drive and was to go all the way down to the Blacktail confluence. That's what we need in the restoration and the remediation.”

#### **2.20.2.2 EPA Response**

The comments received against the changes to the 2006/2011 BPSOU Record of Decision as described in the proposed plan are acknowledged by EPA and noted for the record. Comments specific to different aspects of the proposed amendments are responded to in the specific comment responses found elsewhere in this document.

### **2.21 Reclamation**

#### **2.21.1 Comment Summary**

Five comments were received regarding reclamation and revegetation of capped mine waste within the BPSOU. One comment from CTEC included an attachment with a detailed proposal regarding vegetation standards. One commenter also asked if EPA would continue to look for sources of contamination into BPSOU surface water bodies after implementing the expanded remedy described in the 2020 BPSOU Record of Decision Amendment.

- **Comment 19.1.** “Question: Has EPA ever revised performance criteria upward to a more stringent standard? I was around when EPA came to town. Believe it or not, its main focus was washing and rinsing shovels for fear residuum would cross-contaminate samples and mine waste with 1,000 ppm Cu and 70 ppm Pb might record as 1,020 ppm Cu and 75 ppm Pb. Quality control was front and center. Come to find out, EPA had no idea what to do with the data no matter the level of elevated metals, so it left mine waste in town (!!!) and covered it with grass. Not the minimum 18” of cover stipulated, but according to my measurement of numerous fields about 12 inches and ARCO’s consultant (different sample set) 13 inches. So much for EPA oversight consisting of applying a ruler.

“Waste-in-place is a “solution” no self-respecting community would entertain for one minute. Butte-Silver Bow has always been willing to trade its birthright for a pot of porridge. You wonder why Missoula got Milltown remedy and Anaconda got a golf course underlain by contamination? Self-respect. ARCO was used to beaten-down folks in Butte-Anaconda who would grasp at crumbs (could we please have another ballfield?) when they ran into a community with self-respect and vision (Missoula). Suddenly, money was no object, although



ARCO initially contended that mucking it up would just make a bigger mess. (What followed botched waste-in-place? Instead of tackling the core problem, ARCO-BSB spent lavishly for an evaluation procedure, BRES, a unitless scorecard based more on guesswork than measurement. Nonprofessionals did the scoring for the most part. BSB was supposed to perform maintenance, so that too was botched. What happened? The crummy covers degraded, but the best that could be hoped for was life support in the form of perpetual maintenance. I naively thought revegetation as part of remedy was supposed to be self-sustaining and self-repairing. But let's keep sight of the real issue: is leaving toxic mine waste in uptown Butte a good idea? No, but it's easy.)

“Minimally effective procedures (parading as solutions) are institutionalized by granting variances to standards as in the Anaconda Uplands and now BPSOU. EPA found a procedure to recalibrate its failures. The unrelenting focus must be on outcomes. Waste-in-place has bad outcomes even if perfectly executed. Don't fiddle with ancillary procedures. Remove the waste, that's the proper solution, or at least cover and vegetate it properly. Outcomes must be stipulated, not just procedures. The answer to failure is not to declare that it didn't really matter anyway.”

- **Comment 22.9.** “5.1. The remedy should adhere to Montana's reclamation standards, which are rooted in the belief that reclamation using local native vegetation, including woody species, would provide the most robust and self-sustaining ground cover. The 2006 ROD specified the following relevant and appropriate requirements:

ARM 17.24.711 (Relevant and Appropriate) requires that a diverse, effective, and permanent vegetative cover of the same seasonal variety native to the area of land to be affected shall be established. ARM 17.24.717 (Relevant and Appropriate) relates to the planting of trees and other woody species if necessary, as provided in 82-4-233, MCA, to establish a diverse, effective, and permanent vegetative cover of the same seasonal variety native to the affected area and capable of self-regeneration and plant succession at least equal to the natural vegetation of the area. However, reclamation in Butte has not followed those requirements until recently. CTEC requests that the parties to the Consent Decree, or EPA in the event of an Order, seriously consider a proposal to use Montana Tech's Restoration Ecology program as an integral part of ongoing remedy and the Butte



Reclamation Evaluation System program. Please refer to our full proposal, Attachment B.”

- **Comment 42.1.** “I have a landscaping business in Butte and have had for 20 years, so I've paid attention to these meetings on and off. I don't want to take a side, but I do have a lot to -- not a lot to say, but I could easily have these conversations one on one with some folks in the room. It's a little different speaking in front of everyone. But the main comment is you guys all, probably 90 percent of the people in here, have gray hair. When this all started you were probably around my age. And that's important. Because here's what I see, as a small business owner, if I do a crappy job for a customer, the customer fires me and withholds payment. The standards of the past cleanup have been crappy. At the start of the presentation you have stated there has been a lot of work done since 1987, there's been a lot of work done. The work hasn't been good work. There hasn't been a good job done. It's been a bad job for 30 years. And that's only what I've witnessed for 20 years of being in the landscape business, watching my competitors, who continue to get the contracts, two years later everything they've done is either dead or eroded away. So, to be clear, there's been a lot of work done, but it hasn't been good, it's not good work.”
- **Comment 68.3.** “I agree with Mr. O'Neill about the insufficiency of the reclamation on the Hill. It needs to be looked at very seriously.”
- **Comment 91.5.** “1. There has been limited discussion of project cost and no detail on how restoration features will be financed, and perhaps more important, maintained. 4. There is limited detail on which mine caps will receive attention and what the work will entail. Of greater concern, the EPA has publicly stated it does not know the source of contaminants entering the Creeks. How certain is EPA that the larger contributors of contaminants have been identified? Will the EPA continue to search for sources of the high metal load in the Creeks after the passive pond system is developed? 5. The negotiating parties admit there is only an average of 12" of topsoil on most reclaimed areas, which is far less than other reclaimed mine sites in our area. Additionally, many sites are too steep to slow runoff and establish dense vegetative caps. The caps need more growth medium, re-contoured slopes, and a wider array of native plants for remediation to be considered successful. Will additional funding be available to



make improvements to mine caps or other sources beyond those identified in the Plan?”

### **2.21.2 EPA Response**

The remedy described in the 2006/2011 BPSOU Record of Decision specified that contaminated solid media within BPSOU (i.e., mine waste piles or tailings areas) shall be addressed through a combination of source removal, capping, and land reclamation and revegetation. Since the late 1980s and before the 2006/2011 BPSOU Record of Decision was issued, certain mine wastes within the BPSOU have been capped and revegetated—many under EPA’s CERCLA removal authority. Before deciding if these past response actions would be compatible with the final remedy, EPA evaluated whether the past response actions were consistent with the 2006/2011 BPSOU Record of Decision cleanup objectives and the ARARs. That assessment is found in the BPSOU response action summary document, issued by EPA in 2003. The assessment concluded that all but three of the areas capped as part of the past removal actions complied with ARARs and were consistent with the cleanup objectives established for the final remedy. (The three areas have been subsequently addressed.) The 2003 response action summary document has been added to the administrative record for the 2020 Record of Decision Amendment.

Since the 2006/2011 BPSOU Record of Decision, all reclaimed areas, including capped mine waste, are routinely evaluated and must achieve the performance standards described by EPA in the Butte Reclamation Evaluation System (BRES), which is attached to the 2006 BPSOU Record of Decision as Appendix E. BRES provides for a systematic evaluation of cap stability, vegetation conditions, and other reclamation standards for the reclaimed areas. BRES is presently being updated, as part of the remedial design process, to incorporate new mapping techniques developed since its original preparation. This system is a site-specific tool to evaluate the stability, integrity, and degree of human and environmental protectiveness afforded by EPA-sanctioned response actions or other past reclamation actions initiated on lands impacted by historical mining within the BPSOU. The information obtained from the evaluations is used to develop corrective action work plans, if necessary, to verify that completed response actions both past and future are effective, well maintained, meeting established performance standards, and protective of human health and the environment. The BRES evaluations are being conducted by Butte Silver Bow and funded by Atlantic Richfield pursuant to the CERCLA section 106 unilateral administrative order implementing



the BPSOU remedy. The BRES evaluations will continue to be conducted and funded in this way under a proposed BPSOU consent decree if that document is entered by the federal district court.

EPA agrees with and supports the commenter's assertions that reclamation using local native vegetation and woody species is preferable for the vegetation of capped wastes and other reclaimed areas. EPA will encourage the participation of Montana Tech's Restoration Ecology Program personnel and written materials to improve vegetation conditions at reclaimed sites on the Butte Hill under the BRES system. After consulting with reclamation specialists, EPA approved seed mixes for use in Superfund BPSOU revegetation efforts that are native to Butte and have the best chance of achieving growth and cap stability.

Furthermore, the BRES program, and its implementation and effectiveness, will be evaluated through the CERCLA-required 5-year review process. When issues affecting the protectiveness of the remedy are identified in a 5-year review, these issues are monitored and tracked for resolution. This process gives EPA further authority and leverage in enforcing and/or potentially modifying the remedy.

EPA acknowledges that certain reclaimed sites on the Butte Hill still have substandard vegetation coverage or unsightly appearance, but, critically, the caps are still performing their primary function of separating the wastes from the environment. The BRES evaluations performed by Butte Silver Bow will evaluate site cover conditions, erosion conditions, site edge conditions, and the presence of exposed waste, barren areas, and existing vegetation. BRES evaluations are conducted by Butte Silver Bow on an ongoing basis, and the current Butte Silver Bow evaluation team is responsive when cap integrity has been compromised. Poor vegetation conditions at sites are being identified, and actions are being taken to improve these conditions through vegetation/reclamation improvement plans. In addition, several additional insufficiently reclaimed or under reclaimed sites are specifically described in Attachment C to the statement of work attached to the BPSOU consent decree. These will be evaluated and capped and revegetated appropriately in accordance with the terms of that statement of work attachment. Finally, some sites (usually some of the earliest that were reclaimed under non-Superfund authority) will have to be evaluated under the solid media management plan. Potentially, reclamation will have to occur again.



Regarding the comment about additional sources, the Superfund program has identified major sources to surface water within the BPSOU. Many of those sources have been addressed previously under prior Superfund actions, and the expanded BPSOU ROD provides for addressing remaining sources. EPA always has the ability and authority under CERCLA to require additional actions if other sources of historical mine waste contamination to Silver Bow Creek below the confluence with Blacktail Creek or Blacktail Creek surface water are found in the future.

## **2.22 Regulatory Process**

### **2.22.1 Comment Summary**

Atlantic Richfield commented on EPA's characterization of changes to the remedy, the administrative record supporting the proposed plan, the community's desire for tailings removal, and the authority of EPA to require certain items under Superfund.

- **Comment 98.12.** "C. "Fundamental" Changes to the Remedy. The 2019 Proposed Plan categorizes the proposed remedy changes into three categories—(1) modifications related to the TI waiver for certain surface water quality standards and adoption of replacement standards are "fundamental" changes; (2) modifications that would expand the existing surface water remedy through additional in-stream removals, storm water BMPs, groundwater capture and treatment, and rerouting portions of SBC are "significant" changes; and (3) 13 additional modifications are "non-significant" or "minor" changes, such changes to the BPSOU boundary, the RMAP, and surface water compliance points and assessment, among other things. See, e.g., Proposed Plan at 7-9, 16-19, & Ex. 4. As EPA recognizes in the Proposed Plan, only those changes that are "fundamental" in nature (i.e., the TI waiver) require a formal ROD amendment in accordance with the requirements of CERCLA and the NCP, including seeking and responding to public comments and evaluation of the changes under the nine remedy-selection criteria identified in the NCP. See 2019 Proposed Plan at 9 & Ex. 5; see also 40 C.F.R. § 300.430(e). "Significant" changes require an ESD only, while "nonsignificant" or "minor" changes can be informally documented in the site file. For ESDs and minor modifications, EPA is not required to seek or meaningfully respond to public comments or apply the NCP evaluation criteria. AR agrees the TI waivers are a category.



“AR agrees the TI waivers are a category of remedy modification that are “fundamental” ROD changes. However, AR disagrees with EPA’s characterization of the remaining changes to the remedy, both “significant” and “minor” in nature. Dividing the proposed remedy modifications into three separate categories—thereby avoiding application of important NCP requirements to most of the proposed changes—is inconsistent with EPA guidance and established practice. Specifically, EPA Guidance indicates that remedy modifications proposed together should be considered collectively and characterized as fundamental, significant, or minor based on their collective impact. See EPA OSWER 9200.1-23P, Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Documents, § 7.2 (July 1999) (ROD Guidance). The collective impacts of the changes identified in the 2019 Proposed Plan—in terms of scope, performance, and cost—amount to a “fundamental” change to the ROD. See 40 CFR § 300.435(c)(2); ROD Guidance, § 7.2 (requiring EPA to evaluate “scope, performance, and cost” in characterizing changes to a remedy). In other words, the combination of all of the remedy modifications identified in the Proposed Plan should be characterized, evaluated, and adopted as a “fundamental” change in accordance with NCP requirements applicable to ROD amendments. This includes meaningfully responding to comments on all proposed changes; evaluating all changes under the NCP criteria; and adopting all changes as part of the Amended ROD.

“A. Page 2, Column 1 & Page 22 (Documents). The Proposed Plan identifies five documents as “contributing to th[e] proposed modification” of the 2006 ROD / 2011 ESD, and eight documents as “[k]ey documents used to prepare this proposed plan.” AR also obtained a list of the remainder of the administrative record for the Proposed Plan from the Montana Tech Library, which consists of only 63 documents. AR has identified additional documents it requests EPA add to the administrative record, some of which should be considered “key” documents “contributing to the modification” of the ROD. Those documents are identified on Exhibit B attached hereto.

“J. Page 8, First Paragraph & Page 11, Text Row 3, Column 4. The Proposed Plan states at Page 8: Remedy modifications are based on “the community’s desire to increase the amount of mine waste removals in the upper Silver Bow Creek area to allow for future land uses.” The Proposed Plan states at Page 11: “Remov[al] of buried



tailings in upper Silver Bow Creek at Diggings East and Northside Tailings to accommodate new basins” is “in response to public comment.” Remedy modifications are evaluated using the nine NCP criteria. See 40 C.F.R. § 400.340(e)(9)(iii). Remedy selection is not driven by community desires or input, but an overall evaluation of remedial alternatives based on all of the NCP criteria. AR understands that community desires and input were given meaningful weight in selecting the remedy modifications identified in the Proposed Plan, which AR generally supports as part of negotiated CD that is acceptable to all parties. However, if a final CD is not reached, EPA’s apparent heavy reliance on community desires and input as criteria for selecting certain remedy modifications would be arbitrary and inconsistent with the requirements of the NCP.

“L. Page 11, Text Row 2, Text Column 3, Bullet 3. The Proposed Plan states: “Revegetate and provide a public area for possible recreational use—a continuous link between remedies upstream (Blacktail Creek and upper Silver Bow Creek) and downstream (through Lower Area One).” AR comments that construction of a “continuous link” to areas downstream of Lower Area One described in this bullet are not remedial actions that EPA can require under CERCLA, and such actions have not been assessed in accordance with CERCLA and the NCP. AR acknowledges that these and other end-land-use actions may be included by agreement of the parties in a CD settlement to implement the remedy in the Proposed Plan, along with proposed end land uses. However, these voluntary agreements and commitments are not remedial actions under CERCLA, and therefore should not be described as remedies, if they are described at all in the Amended ROD.”

### **2.22.2 EPA Response**

While EPA appreciates the concerns raised in the comment, the structure of the proposed plan and categorization of changes were intended to assist the community in assessing the various proposed changes to the 2006/2011 BPSOU Record of Decision and has been completed. The 2020 BPSOU Record of Decision Amendment reflects the assessment of all changes in accordance with the nine criteria required under the NCP requirements. All proposed changes, no matter how categorized, were subject to public comment as part of the proposed plan, and all significant comments have been responded to in accordance with the NCP regulations. No part of the NCP requirements was avoided. EPA intended



the proposed plan to be a transparent, comprehensive list of the changes being made to the 2006/2011 BPSOU Record of Decision for the public.

The key documents identified in the proposed plan were prepared using information from many supporting documents. Atlantic Richfield states that additional documents should be added to the administrative record but does not state why. It is not necessary to include all documents developed during the implementation of the 2006/2011 BPSOU Record of Decision in the administrative record supporting the proposed plan for the 2020 BPSOU Record of Decision Amendment. EPA believes the existing administrative record, as supplemented by certain documents added as part of its consideration of public comment on the proposed plan, is sufficient and in compliance with all legal requirements.

EPA disagrees that community desires are not included in the evaluation of remedial alternatives. Community acceptance is one of the nine NCP criteria that EPA is required to evaluate when it selects a remedial action or modifies an existing one through a record of decision amendment. EPA has considered community acceptance. The 2006/2011 BPSOU Record of Decision did not require removal of the tailings and other mine waste in upper Silver Bow Creek for the purposes of remediating groundwater. However, removal of whatever material is necessary to allow capacity for stormwater detention ponds is wholly consistent with the remedy for the stormwater portion of the remedy, and it helps to address the community's desire for additional waste removal.

EPA agrees that the voluntary agreements and commitments toward the end land uses that may be implemented through dialogue between responsible parties, the State of Montana, and community members are not remedial actions under CERCLA, and that specifics about these measures do not need to be included in the 2020 BPSOU Record of Decision Amendment. EPA appreciates the efforts of Atlantic Richfield and the State of Montana to engage in this dialogue and to develop the voluntary agreement and commitments in the end land use plan that was released to the public in May 2019. A modified version of this document is attached as an addendum to Attachment C to the statement of work, which is an appendix to the consent decree.



## 2.23 Remedy Effectiveness

### 2.23.1 Comment Summary

One comment was received that stated the need for assurances given that, if the proposed remedy does not perform as expected, there are ways to adjust or take different actions.

- **Comment 71.2.** “The other thing I want to bring up is many of the meetings I've been to I've heard the words "hope anticipate, expect." I don't hear "We're going to guarantee that this is going to take care of these problems." So, with that in mind, I want to know what Plan B is. If the guarantee doesn't happen, how are we going to know that solutions will be resolved and corrected so that it comes out in our advantage?”

### 2.23.2 EPA Response

The effectiveness of all aspects of the remedy will be evaluated through the CERCLA-required 5-year review process. When issues affecting the protectiveness of the remedy are identified in a 5-year review, these issues are monitored and tracked for resolution. This process gives EPA further authority and leverage in enforcing and/or potentially modifying the remedy. EPA's remedies are required by the CERCLA law to be reviewed every 5 years to determine if the remedy is being implemented as described in any decision document such as this BPSOU Record of Decision Amendment and is protective of human health and the environment. See section 121(c) of CERCLA, 42 U.S.C. Section 9621(c). Also, the proposed consent decree, or any other CERCLA enforcement mechanism that implements a modified remedy, allows EPA to take further action at a given site, if necessary, based on new information or unknown conditions or other factors. See section 122(f)(6) of CERCLA, 42 U.S.C. Section 9622(f)(6). The additional work that can be directly required under the proposed consent decree is outlined in Section 1.3 of the proposed scope of work and Section IX of the proposed consent decree. EPA will carefully monitor the remedy as it is being implemented and after it is implemented to verify that it does what it is intended to do and will take further action if necessary to protect human health and the environment

## 2.24 Risk Issues

### 2.24.1 Comment Summary

Four comments were received regarding human health risk assessment issues. Some are repetitive as they were received in writing and in oral



comment at one or both public meetings. There was concern about the exposure term “occasionally,” synergistic effects of contaminants, elevated disease rates in Butte, and long-term monitoring for human health.

- **Comment 7.11.** “15. Occasional Exposure: The word, “occasionally,” is used often in legal documents from EPA, with regard to health risk evaluations. No-where have I found an EPA definition of the word, For the sake of transparency, please define the word in the context of children playing among mine wastes more often than a one-day dose. The first few pages of my college Toxicology tome deals with frequency/response and cumulative dose curves. Please provide better terminology to characterize the hypothetical 6-year-old used in your risk data sheet who was considered safe after a “short term one-day pulse” of exposure to sediment and stormwater in your proposed plan. Some years ago, I wrote to EPA asking whether our godchild, now dead, was safe playing in the Northside Tailings area next to her home, and the response was the child was safe to play there “occasionally.”

“20. Stormwater Ponds and Recirculating Stormwaters proposed for the Silver Bow Creek corridor are dangerous to the health of children. The plan calls for ponds that will ebb and flow with the amount of rain. This will leave deposits of Lead and the other contaminants on the soils between the high and low water areas at the edge of the ponds. Children love to splash and play in water. Signage directing them to stay away will not be effective. “Occasional” use by children is not defined. The hypothetical 6-year-old girl used in the Health Risk on this topic requires a redo with far fewer assumptions and estimates. The Lead and Arsenic standards should be set for Residential. This issue definitely requires community education -- or attractive wrought iron fencing around the ponds.”

“21. Birds, Animals more important than Humans? EPA Health Risk Data also discusses risk to pets and wildlife. For some nesting birds, you say long-term monitoring will be done with evaluation whether or not they are being harmed, and steps to mitigate if needed. Why not give humans that benefit, as well? With the highest allowable amount of Lead in the nation here in Butte, I suggest you provide long-term monitoring of small humans who come into contact with the proposed stormwater ponds.



“23. Synergism of Contaminants has barely been studied by EPA’s sister agency, ATSDR, the Agency for Toxic Substances and Disease Registry. I have asked about synergism of the Butte Contaminants of Concern in public comments over the past 25 years. Lately I have heard an AR contractor say these have been studied. Where is that information and why not brought forward? Likely because only one, possibly two interactions have been studied. Casserett and Doull’s “Toxicology,” 8th edition, contains more information on how metals interact with one another to cause disease than does any Butte area Superfund document. In a letter I wrote to EPA in 2005, I mentioned I’d encouraged initiating studies to determine adverse synergism for many years. Even then, an epidemiologist at the BSB Council of Commissioners said this had been done. Web research showed only one of the four human health COCs had been studied. Misleading information keeps citizens from being able to comment effectively. I provided EPA with a copy of my Undergraduate Research Paper of 1997 (CDC death rate figures 1972-1994) which showed the upper Clark Fork watershed had four times national death rates for Multiple Sclerosis and Lou Gehrig’s (ALS). A reasonable person would expect this watershed anomaly could be related to mine waste contaminants that move downgradient; i.e., synergistic effects of combinations of lead, arsenic, mercury and cadmium.”

- **Comment 59.3.** “First, the word "occasionally." I wrote to EPA asking about the word "occasionally" some years back, when I had a Godchild who was playing on the Northside Tailings continually. The reply I got said that occasional use of this -- of that area for play would not be harmful to the child. That child is dead now. So sometimes I have to wonder about mental health of people living in Butte. I've heard a speaker talk about that. And I'm wondering if EPA has ever looked into what happens when people live within a contaminated area, how does it affect them, do they take their own life. And that's about as bad as it could get, I guess. The word "occasionally" is often used in legal documents from EPA, usually with regard to health and risk -- health risk evaluations. Nowhere have I found a definition of the word "occasionally" in EPA documents. For the sake of transparency, will you please define the word. Early on Page 9 of my 20-year-old toxicology class textbook, it deals with the frequency/response and cumulative dose curves. Please provide scientific terminology to characterize the hypothetical six-year-old used in your risk data sheet who was considered safe when he or she



had a, quote, short-term, one-day pulse of exposure to sediment and storm water in your proposed plan. And define "occasionally" in the context of children playing among mine wastes more often than one-day dose. In the latest health risk data sheet from EPA, which I just referred to above, regarding lead, a risk of lead poisoning, there is no mention of the vulnerable or immune-compromised humans. My old toxicology tome considered this important, dealing on Page 18 with the genetic makeup of individuals who may come into harm when -- We're doing five minutes? I didn't know that. That's what you get when we're showing up a little late. What have I got left? The word "occasionally" is often used in legal documents from EPA, usually with regard to health and risk -- health risk evaluations. Nowhere have I found a definition of the word "occasionally" in EPA documents. For the sake of transparency, will you please define the word. Early on Page 9 of my 20-year-old toxicology class textbook, it deals with the frequency/response and cumulative dose curves. Please provide scientific terminology to characterize the hypothetical six-year-old used in your risk data sheet who was considered safe when he or she had a, quote, short-term, one-day pulse of exposure to sediment and storm water in your proposed plan. And define "occasionally" in the context of children playing among mine wastes more often than one-day dose. In the latest health risk data sheet from EPA, which I just referred to above, regarding lead, a risk of lead poisoning, there is no mention of the vulnerable or immune-compromised humans."

- **Comment 60.1.** "And I'm speaking tonight on behalf of the Greeley Neighborhood Community Development Corporation, Inc. And it's our concern that the ROD is overlooking a potential human health concern; namely, the chronic ingestion of metals and airborne particulates. The same particulate that can be suspended in the streams can also be entrained in the air under the right atmospheric conditions. And people can inhale that particulate and ingest the metals by swallowing their phlegm. Recent work in a published peer-reviewed scientific journal found that the residents in Butte had elevated metal loading indicative of chronic exposure. While the BPSOU risk assessment investigations included extensive air quality monitoring and concentrated on arsenic, a recent study suggests that a more comprehensive list of elements, including arsenic, aluminum, copper, cadmium, manganese, molybdenum and uranium should be considered to quantify human health risks fully. This is because a chronic metal burden can interact with genetic predispositions to



cause a number of conditions, such as neurodegenerative disorders, as well as cancer. And it has been well-known, according to the CDC, that Butte has had elevated cancer and neurodegenerative disease rates prior to the beginning of the BPSOU cleanup. But it's in dispute that the disease rate is declining in proportion to the remedy according to another recently published study.”

- **Comment 64.2.** “I share an address with Mary Kay. I want to continue on with her statement. She and I met over 20 years ago on this very issue, and at that time it was shutting off the pumps in the Berkeley Pit and letting the water go up. I remember that was my, as a state and local government teacher, that was my introduction to how local government really worked. I just want to pick up where Mary Kay left off. She's asking you to define how often the children, such as her Godchildren, would have to play in and around the storm water and the soils that we've caught in the ebb and flow of the ponds. Your health risk data sheet discusses risks to pets and wildlife. In the cases of nesting birds, you state that long-term monitoring will be done and EPA will evaluate whether they are being harmed and take steps to mitigate them if needed. I ask you that you also provide long-term monitoring of humans that come into contact with the proposed storm water ponds. Why not give humans that benefit, as well? Why not, given that EPA has established the highest allowable amount of lead in the nation for the Butte standard. Synergy of contaminants has barely been studied by EPA's sister agency, ATSDR, Agency for Toxic Substances and Disease Registry. Mary Kay has brought that topic forward in public comments for the last 25 years. And, these days, public meetings on health have Atlantic Richfield and other contractors saying synergy of Butte contaminants are being studied. Really? About two of them have been. Casserett and Doull's Toxicology tome, 8th Edition, has more information on how metals interact with one another than does any Butte area Superfund document. She would be happy to purchase a copy of that book for EPA epidemiologists.”

#### 2.24.2 EPA Response

**Occasional exposure:** The expression “occasional” exposure is a simplified term that is used to convey an exposure scenario that is not continuous in nature. Residential exposure scenarios are often referred to as continuous exposures because risk estimates assume an exposure frequency of 350 days per year, whereas shorter term exposures, such as



recreational or trespassing scenarios, are or can be referred to as occasional exposures. Information on the assumptions used in EPA's recent stormwater basin risk evaluation, including the specific exposure values used to estimate short-term risks, were presented in a detailed technical memorandum prepared in April 2019, which is part of the administrative record for the 2020 BPSOU Record of Decision Amendment. Stormwater basins are engineered structures used to protect the environment and are not meant for recreation. Thus, the stormwater evaluation focuses on infrequent exposures of limited duration.

The 1994 baseline risk assessment for lead and the 2003 Walkerville residential site final human health risk assessment also provide the detailed exposure frequency and duration assumptions that support the chronic risk estimates, which are more continuous in nature and the primary basis of the 2006/2011 BPSOU Record of Decision. The stormwater basin risk evaluation technical memorandum and the site human health risk assessment documents are available in the administrative record for the amendment if additional details are desired on specific exposure input parameters and assumptions.

**Synergistic effects:** Between-chemical interaction is an important uncertainty in the risk characterization process. While the toxicological literature is clear that between-chemical interactions can occur, there is less information on how and why these interactions occur and whether these interactions are important for the purposes of quantitative risk evaluations. In some cases, one chemical may have no interaction with another chemical, but in other cases, the effects of one chemical on another may cause responses that are approximately additive, greater than additive (synergistic), or less than additive (antagonistic). In most cases, available toxicity data are insufficient to define what type of interaction is expected or the magnitude of the effect.

Human health risk assessments used at Superfund sites assume effects are additive for noncarcinogens that act on the same target tissue and for carcinogens (all target tissues). Although synergistic (and antagonistic) chemical interactions are not quantitatively evaluated in the BPSOU risk assessments, to the extent important interactions are occurring, these would be accounted for in the results of any community health studies. It is for this reason that the RMAP includes a medical monitoring component. It is also why the medical monitoring study results are considered to provide the most robust metric of actual risks in the community.



**Elevated disease rates in Butte:** The RMAP is focused on monitoring and evaluating the effectiveness of the Superfund remedial action. The mission of the ATSDR is to prevent exposure and adverse human health effects and diminished quality of life associated with exposure to hazardous substances from waste sites, unplanned releases, and other sources of pollution present in the environment. To date, five ATSDR studies of disease prevalence have been conducted in Butte. An ecological study of skin cancer was published in 1992, which was followed by three surveillance studies of cancer mortality and/or incidence in 2002, 2012, and 2018. The fifth study was an ecological study that examined mortality rates of a broad range of diseases. None of these studies included individual level exposure data or occupational history, and all are surveillance or ecological studies that are hypothesis-generating studies primarily used to suggest future studies that should be done. None of these studies can be linked to causes of observed, elevated incidence or mortality. Hypothesis-generating studies that have been conducted so far do not support concerns about elevated cancer rates in Butte. Rates of diseases other than cancer are difficult to study because there are no registries that reliably document incidence. The community health needs assessments have provided the most useful source of information on prevalence of major disease categories. The findings of these assessments have been reviewed and will be included in current or future health studies. ATSDR may work with state and local health departments to conduct additional site-related public health assessments to better address general public health concerns regarding community mental health, fetal health and exposure, and cancer incidence rates for Butte if warranted.

**Long-term human health monitoring:** EPA agrees long-term monitoring of both ecological and human receptor populations is an important component of the remedy. The stormwater basin risk evaluation included an evaluation of potential exposures for wildlife and pets and noted that future evaluations would assess the effectiveness of these basins in improving water quality and potential future exposures for local wildlife residing within the stormwater basins. Although future evaluations of human receptor populations are not discussed as part of the stormwater basin technical memorandum, the RMAP includes long-term monitoring of human receptor populations in Butte. Such monitoring efforts would account for potential exposures from all site-related sources, including the stormwater basins.



## 2.25 RMAP Expansion

### 2.25.1 Supports Modification

#### 2.25.1.1 Comment Summary

Four comments were received in favor of the RMAP expansion as described in the proposed plan.

- **Comment 4.6.** “The RMAP expansion in the proposed plan is praiseworthy. RMAP is a nationally recognized lead cleanup program and goes far beyond what could be ordered under Superfund.”
- **Comment 8.6.** “The plan expands the widely praised RMAP program to encompass most of Silver Bow County—providing opportunities for residents outside of Butte proper to benefit from the program’s resources to protect their families from heavy-metal exposures.”
- **Comment 9.4.** “Thank you for all the areas that have been already done and plan to get done. The RMAP for the entire county is a great change expanding it’s impact helping create a safe environment. Thank you for your time on issues with such grave consequences for Butte families, Butte community, and the State of Montana. I’m leaving you with the knowledge that cooperation by those controlling the dollars and decisions, those with restoration knowledge, government decision makers, and you, the EPA can make it happen. Your efforts are greatly appreciated.”
- **Comment 55.5.** “The last thing I'd like to talk about was a total surprise to me, and that was the expanded program for yard and home cleanup. And expanding it, that's the second time it will be expanded. The first time was in 2011, when the EPA issued a unilateral administrative order. And they said, "We're going to take care of attics across a broad expanse of Butte." And this time they're saying, "We'll do the whole residential metals abatement program." Most of the county, almost the entire county. That's -- that's a big expansion.”

#### 2.25.1.2 EPA Response

The comments in support of the RMAP expansion as described in the proposed plan are noted. After the public comment period closed, Atlantic Richfield requested that the RMAP expansion and the health studies be addressed outside of the consent decree. EPA and Montana DEQ agreed to implementing this aspect of the amended record of decision through the existing CERCLA BPSOU unilateral administrative order. This approach will allow the expanded RMAP plan and the structure of the 5-year



medical monitoring study and other public health study efforts to be developed outside of the confidential consent decree process and with public input as draft documents are submitted by the unilateral administrative order respondents. The expanded RMAP will cover the area that is part of the West Side Soils Operable Unit, where EPA has begun conducting a CERCLA remedial investigation gathering information to determine who the appropriate potentially responsible parties are for this area. Atlantic Richfield disputes that it is the primary responsible party and liable for all mining activities that generated remnant mine wastes in the Westside Soils Operable Unit. EPA's investigation of Westside Soils Operable Unit liability issues is not complete, and Atlantic Richfield has ongoing concerns regarding conducting remedial work on private property. Thus, implementing the expanded RMAP and the health studies under the existing unilateral administrative order will allow for this work to continue uninterrupted while the liability issues are further addressed

## 2.25.2 Other

### 2.25.2.1 Comment Summary

Sixteen comments were received that provided suggestions or requests for the planned RMAP expansion. Topics were wide-ranging and included testing in attics; renter requests for RMAP testing; inclusion of schools, vacant lots, parks, and other non-residential properties; retaining walls, curbs, and gutters; public education outreach to acquaint people with the RMAP; verifications from EPA in the final consent decree to allow changes if lead regulations change; consideration of a "level of concern" for urinary arsenic; exclusion of some industrial areas; and modifications to the schedule.

- **Comment 4.7.** "Given that, under the proposed plan, the homeowner or property owner will have to initiate contact with RMAP in order to get their property assessed and, if warranted, cleaned up, an aggressive and comprehensive public education program will be necessary. While not necessarily needing to be made an official part of the proposed plan, an addendum should be added to the proposed plan that details this education plan or, at least, provides the parameter of this public education plan. Does EPA acknowledge that the arsenic in the attics in the expanded RMAP area emanates either from past smelting activities in Butte or from the Anaconda smelter and is therefore under the remediation purview of Superfund."



- **Comment 7.13.** “17. No RMAP for the Poor? A recent full-color, two-page Atlantic Richfield ad, titled TO THE BUTTE COMMUNITY, stated “under the proposed plan RMAP would become available to thousands of additional residents at their request.” Does that mean renters in substandard housing can simply ask and have their attics and yards evaluated? In fairness to the low-income people living in the old rental housing on the Butte Hill, please require changes to the RMAP program so that these folks are allowed to request that their homes be checked for excess arsenic and lead without going through the landlord/owner. For those yards or homes that do require remediation, EJ demands you not allow owners to escape that cleanup. If a local ordinance is required to make this happen, I will happily help with it.”
- **Comment 13.2b.** “There is widespread consensus among experts that there is no safe exposure level for lead. RMAP needs a greater funding level throughout this project lifetime to ensure that it can succeed with a program that can keep public confidence and is provably effective. In this regard, we also urge that the RMAP program be technically updated in terms of protocols and procedures due to the need to provide a lead-safe environment for Butte residents. Please ensure that Butte’s clean-up embraces the possibility of a clean, healthy future, rather than the evidence that Butte is being left with its citizens and children at risk, clearly and obviously exceeding national standards for lead levels.”
- **Comment 22.11.** “6.2. EPA must be ready to take enforcement action to force access to the Residential Metals Abatement Program (RMAP) for rental residences where landlords refuse RMAP service and child occupants have elevated blood lead levels. CTEC is concerned that the failure of some landlords to engage the RMAP program presents an unacceptable risk to child occupants. To date, RMAP testing and remediation has been limited to those landowners who agree to the service. The nexus between low income renters and substandard rental housing which is more likely to be contaminated by past mining impacts and lead paint presents a pressing environmental justice concern that cannot continue to be ignored. The amended ROD should address this loophole and ensure that renters are not exposed to contaminants.

“6.3. The proposed expansion of the RMAP Program boundary to encompass rural residents to the north, south, and west, including



Rocker is a good idea. The RMAP Program provides one of the most significant protections of human health provided by Superfund in Butte. Mining and smelting impacts do not obey Superfund Operable Unit borders. The proposed change is needed to afford the same level of protection to residents outside of Butte proper to benefit from RMAP's resources to protect their families from heavy-metal exposures.

"6.4. The ROD amendment should be clear regarding which program has responsibility for remediation of schools, vacant lots, parks, and other non-residential properties. It is CTEC's understanding that RMAP has taken responsibility for remediation of some of these non-residential properties; but clarity is lacking in an EPA decision document regarding responsibility for non-residential properties. A gray area currently exists between those larger properties covered by BRES and residential properties covered by RMAP. The amended ROD should ensure that both residential and nonresidential properties where children may be exposed to contaminants are prioritized for remediation."

- **Comment 24.1.** "There is a need for a program that helps address deteriorating retaining walls, curbs and gutters associated with residential properties in the BPSOU. The program could be similar to Sidewalk Replacement Program that Butte-Silver Bow has in place. A fund would be included in the RMAP. Residential property owners could get a loan for a period of time to replace deteriorating retaining walls, curbs and/or gutters. This program would protect reclaimed properties from re-contamination from storm water run-on. It would protect uncontaminated properties from the possibility of being contaminated from storm water run-on. I believe the PRPs would benefit from this program as a protection of remedy. The funds to run the program could only be used in the BPSOU, on residential properties and the property owners would repay the amount of money they borrow from the fund in a reasonable amount of time. I believe the side walk program is 7 years. This type of program would ensure that the proposed remedy will continue to protect human health for the long term."
- **Comment 31.6.** "4. Residential Metals Abatement Program. It is my conclusion that the Modifications to the ROD with regards to the Residential Metals Abatement Program are due to a lack of proper planning and execution of past cleanup activities by engineers and



contractors. Cleanup activities planned, presented, and executed by licensed engineers and engineering firms\* were haphazard, and without regard to sources of both groundwater and surface water metals and minerals that test outside of acceptable levels.

“These are two very distinguishable problems with the Residential Metals Abatement Programs.

1. First, the establishment of the program legally acknowledges, with testing as proof, that elevated levels of metals and minerals occur inside of private homes, commercial buildings, and developed real estate and their exterior yards and gardens. Any intelligent person can comprehend that the Butte Hill was the primary area containing active mining and residential homes, where miners and peoples engaged in mining activity carried mud and dirt into homes and buildings on a daily basis. These are also the immediate areas where wind carried and deposited minerals and metals in dust form into open doors, windows, and yards for nearly 100 years. The action to establish the RMAP program alone is an acceptance and acknowledgement of responsibility.
  2. The second problem with the RMAP program is the proposed expansion of the area where homes can be tested, now an area to include the entire county. It has been stated by the EPA and ARCO that by expanding this area, they are diffusing liability over the long term by proposing an alternative that has very little to no correlation with the actual source of the problem. The source and location is the Butte Hill, not Wise River. Expanding the area redirects the attention, liability, and responsibility away from areas that contain actual mine waste and attempts to dissipate responsibility for the past activities.”
- **Comment 40.4.** “In terms of expanding the RMAP program, since it's going to be voluntary in the sense that people have to contact the agency to get their property cleaned up in the area outside of the original BPSOU boundary, I would urge the agency to incorporate into their proposed plan an aggressive public education outreach to acquaint people with this RMAP program, how to contact it, what it can do, what it cannot do, so that people avail themselves of this. So I think it needs an aggressive public outreach program. I don't see that specified in this document.”



- **Comment 42.3.** “The residential metals abatement program, I think, is another crappy job where we're taking homes that probably need to be knocked down, that you could get a small group of men and push over, and we're cleaning them up. Just as a comparable, a billion dollars has been spent cleaning this up. Apparently, according to the paper. I don't know where that number comes from. But you could knock down all the houses, and you could build 7,142 \$140,000 homes for a billion dollars. Anyways, that's all I have to say.”
- **Comment 53.12.** “The areas where there's problems and there are going to continue to be a problem for 100 years -- I mean, they set up this RMAP money for, like, 99 years originally. It might be down to, like, 91 or 90 years. I mean, these areas need to be cleaned up. These houses aren't even going to last 90 years. You might as well just give the whole city to Washington and let him tear down the whole Uptown Butte, because that's probably just as good as what they're doing, which is nothing.”
- **Comment 56.4.** “I want to say a couple of things about the RMAP expansion. I, too, support that. The RMAP is a nationally recognized lead abatement program that goes far beyond what Superfund can order. Looking at lead paint, for example, that paint is not a toxic waste from mining. In the expansion of this RMAP program, I would call for specific consideration of, again, how are we going to involve the environmental justice community and how are we going to publicize this program for all citizens.”
- **Comment 57.3.** “And so that -- that particular thing within the RMAP expansion is very important for us to see that you would adopt the same action level for Anaconda, which is 400 parts per million lead. And that's a great place to start with your cleanup, because you will build confidence and you will build health. But if you leave action levels at 1,200 parts per million, what is bound to them -- I have done much sampling in my career. We've had to. A building that we own Uptown had 17,000 parts per million lead and arsenic because of a fan pumping smelter dust into the fourth floor. That was one of our first EPA cleanups. Because EPA came and cleaned up the hallways in that floor, but not the residences. You know, the RMAP program doesn't have enough funding, it isn't large enough and it isn't comprehensive enough. It's a miracle for what it is, but it doesn't go to where you have to be to get confidence. This town deserves to grow. It deserves to have what all the towns around it have, as far as the confidence and



health of the people. And so it's very important to us that you strongly consider the open working document of the RMAP program, to drop it to 400 parts per million for both Butte and Anaconda, otherwise it's going to be hard to continue to build new housing here. Thank you.”

- **Comment 64.3.** “In a recent copy of the Montana Standard, Atlantic Richfield placed a full color two-page ad entitled: "To the Butte Community." In it they state, quote, under the proposed plan RMAP would become available to thousands of additional residents at their request. Does that mean that renters in substandard housing in Butte can simply ask and have their attics and yards evaluated? That is something that has been argued for in the 18-month long Lead Levels Advisory Committee meetings in the mid-1990s. Please, will EPA use their often-mentioned ability to force landlords to have the places they live in evaluated.”
- **Comment 81.2.** “And, very importantly, “that people living in rental housing on the Butte Hill must be allowed to have their homes checked to see if there is too much lead or arsenic in the attic or yard soil.” I’ve heard her speak at many County Commission meetings about the crime of leaving renters at the mercy of their landlords. Unless their landlord requests the tests for lead in the soil, no tests are done! She still is demanding “environmental justice for the poor in Butte.”
- **Comment 82.4.** “Furthermore, as it now stands, only property owners are allowed to request that their rental housing be tested to determine if lead or arsenic in the rental home or in the yard soil exceeds safe levels. This needs to be corrected so that the people impacted (those that live in the rental housing) are authorized to make the request. Failure to address this aspect of the plan could potentially expose EPA as condoning discrimination against the low income individuals that reside in these rental units.”
- **Comment 96.4.** “1) Residential Metals Abatement Program (RMAP). The Proposed Plan calls for the expansion of the RMAP to address residential properties well beyond the current boundary of the Priority Soils Operable Unit (Minor Modifications #2, #8, #9, #10). Butte-Silver Bow fully supports this expansion, as well as the continuation of triple-depth sampling, which will increase the number of yards eligible for abatement. Coupled with the expansion, Butte-Silver Bow supports the proposed modifications to the schedule of yards and attics



to be sampled and abated per year, as well as proposed changes to address challenges with property owner participation and addressing commercial buildings under the attic abatement portion of the Program. As a corollary to the changes outlined in the Proposed Plan, Butte-Silver Bow would ask for verifications from EPA in the final Consent Decree a) to ensure the RMAP will operate in concert with any regulatory changes in the relationship between Elevated Blood Level guidance and removal action levels, both for soils and indoor dust; and b) if bio-monitoring for arsenic is required, that a “level of concern” for urinary arsenic is defined.”

- **Comment 98.6.** “RMAP Expansion. Under the Proposed Plan, the established Multi-Pathway Residential Metals Abatement Program (RMAP) will be expanded outside of the BPSOU to assess and abate pathways of residential exposure to metals in the greater Butte community. The RMAP has evolved from what was once known as the Multi-pathway program, a program of medical monitoring and residential assessment and abatement that was initiated in the 1990s. The current RMAP requires investigation and, where action levels are exceeded, remediation of arsenic, lead, and mercury contamination at all residential properties within the BPSOU. Within an expanded geographic area, the current program offers sampling and abatement of residential attics. The RMAP investigates all sources of metals of concern that may contribute to human health risk, not just those that are related to historic mine waste sources.

“The success and importance of the RMAP is evident in recent medical monitoring data analysis performed in Butte, which considered nearly 3,000 blood lead level records collected from Butte children from 2003 to 2010. In short, that study determined that blood lead levels in Butte children have dropped dramatically since 2003 (average levels for 2010 of 1.6 µg/dL were less than half of the levels for 2003 of 3.5 µg/dL) as a result of the RMAP, and therefore concluded that the program has been effective in identifying and mitigating potentially harmful exposures to sources of lead, arsenic and mercury in the Butte community and recommended that the program continue. See Butte Priority Soils Operable Unit, Public Health Study—Phase 1, at ii-iv, 78-80 (2014). AR agrees that the program, which BSB County operates with funding from AR, has been successful and remains a key element of the holistic BPSOU remedy.



“The Proposed Plan identified two modifications to the RMAP: (1) expand the boundary of the RMAP program to include rural residential areas outside the BPSOU to the north, south, and west of Butte on a test-by-request basis, Proposed Plan at 16 & fig. 4 (Modification No. 2); and (2) modify the RMAP sampling and remediation targets, id. at 19 (Modification No. 8). As an element of a final CD acceptable to all parties, AR supports expansion of the RMAP to make the program available to residential owners and occupants outside the BPSOU on a test-by-request basis. Because the expanded RMAP area, as described in the Proposed Plan and depicted on Figure 4, includes three industrial facilities where residential development is not anticipated or currently permitted, AR requests that such areas be excluded from the geographic scope of the expanded program. A map showing the three requested exclusions is attached as Exhibit A to these comments.

“In addition, the southwestern boundary of the expanded RMAP area proposed by EPA in the Proposed Plan (the portion in T2N R11W, T2N R10W and T2N R9W) shown in Figure 4 to the Proposed Plan extends outside the boundary of BSB’s Excavation Control District. See BSB Municipal Code, Ch. 8.28 (Excavations and Dirt Moving). AR therefore requests that EPA replace Figure 4 of the Proposed Plan with the figure attached as Exhibit A and describe such exclusions and boundary revision as part of this remedy modification.

“AR also generally supports modification of the existing RMAP targets and deadlines identified in the 2011 ESD. Specifically, AR comments that the existing timelines identified in the 2011 ESD should be removed because they are unrealistic and unachievable as the RMAP expands to cover thousands of additional homes and yards. The RMAP work schedule should be replaced with a more realistic, technically feasible level of effort approach with pace of sampling and remediation targets. Because RMAP is a voluntary program that removes all sources of lead from homes that qualify for remediation, including lead paint and other lead sources that are exempt from CERCLA, the proposed expansion of the RMAP will require AR and BSB support and concurrence. AR is willing to fund the proposed RMAP expansion as part of an agreement to implement the Proposed Plan that is incorporated into a final CD among AR, BSB, EPA and the State. The RMAP program is structured to prioritize assessment and remedial measures for those most at risk in the community. This



approach, coupled with revised “level of effort” requirements, will ensure that the community is protected in a manner that goes above and beyond the requirements of CERCLA, without the arbitrary and unachievable deadlines set out in the ESD. AR also requests that EPA remove the requirement for mercury monitoring under the RMAP program, for the reasons described in the specific comments below. See Comment No. III.T.

“T. Page 19, Modification 8. In addition to modifying RMAP target numbers, EPA should remove the requirement in Section 12.3.1.1 of the ROD for mercury monitoring under the RMAP program. Mercury monitoring to date within the RMAP area has shown that elevated levels are limited to a small area and appear to be related to re-use of mercury-impacted timbers in older housing. EPA agreed to remove the requirement to analyze mercury in soil samples as part of the 2010 RMAP Plan revisions based on 10 years of results showing no exceedances of the 147 mg/kg mercury cleanup criteria. Given there is now 17 years of attic dust monitoring results showing no exceedances of the mercury cleanup criteria (with the vast majority of the results being non-detect) it is appropriate to similarly remove the requirement to monitor mercury in attic dust and the medical monitoring program. BSB County is in the process of compiling all of the historic mercury monitoring results and will provide this data summary to the EPA and MDEQ as part of the 2019 revision of the RMAP Plan.”

#### **2.25.2.2 EPA Response**

The RMAP is a critical component of the remedy selected in the 2006/2011 BPSOU Record of Decision and its expansion through this 2020 BPSOU Record of Decision Amendment and an associated unilateral administrative order will provide further public health protection in Butte and Silver Bow County. The RMAP is implemented by Butte-Silver Bow County staff and uses a prioritized approach to address affected and sensitive populations, such as those persons determined to have elevated blood lead results, young children, and pregnant or nursing mothers. In addition, the program requires that all residential properties within the BPSOU must be sampled, assessed, and abated within a reasonable time frame if action levels for arsenic, lead, and mercury are exceeded. This includes the cleanup of attic dust in accessible attic spaces.



In 2011, the attic portion of the RMAP was expanded to include areas south and west of the BPSOU boundary. The 2019 proposed plan expands the RMAP boundary farther to include rural residential development outside of the BPSOU and additional properties within the BPSOU, such as schools, parks, vacant residential lots, and businesses with residential apartments. The proposed boundary for the expanded RMAP is adjusted to encompass the extent of Butte Silver Bow's Excavation Control District. See Figure A-2 of the 2020 BPSOU Record of Decision Amendment. The proposed boundary also was adjusted in the final RMAP plan to exclude non-residential areas (other than parks, schools, and other areas where children recreate, as well as businesses that have residential units within them) and include the extent of Butte Silver Bow County's Excavation Control District. EPA believes that the intensity of historic mining activity generally diminishes with distance away from the BPSOU boundary (the Berkeley Pit and present-day active mining areas excepted); therefore, the likelihood of mining-related action level exceedances is reduced in areas outside of the BPSOU surface boundary. Properties outside the BPSOU boundary but within the RMAP expansion area will be sampled by request as opposed to the systematic sampling for properties within the BPSOU.

The RMAP is designed to mitigate exposure to sources of lead, arsenic, and mercury to residents of the BPSOU and expanded area from contamination that may originate from both mining-related (waste rock, tailings, aerial emissions) and non-mining-related sources (lead-based paint and lead solder). As designated responsible parties, both Butte Silver Bow County and Atlantic Richfield implement the RMAP, with EPA and Montana DEQ oversight. In practical terms, Butte Silver Bow County implements the RMAP with county personnel via funding from Atlantic Richfield. Both parties are committed to diligently executing the RMAP over the long term with adequate funding. EPA and Montana DEQ are responsible for RMAP oversight, review, and approval of sampling plans and site-specific remediation plans. The latest sampling plan contains sampling procedures for residential yard soils, earthen basements, attic dust, and drinking water. The plan specifies use of portable x-ray fluorescence technology to test paint for lead content, special vacuums to collect indoor dust samples, and a mercury vapor analyzer to check the air. Butte Silver Bow County technical personnel are trained in the proper use of field equipment and follow standard operating procedures included in the sampling plan.



No modifications to the RMAP soil action levels or biomonitoring approach are proposed at this time. Biomonitoring will continue to focus on blood lead biomonitoring, with increased tracking and follow-up for individuals with elevated blood lead levels. As appropriate, increased outreach to local pediatricians and clinics will be used to augment the available blood lead data. Two prior arsenic biomonitoring studies conducted in Butte and a recent study in Anaconda have not found any evidence of elevated arsenic exposure due to arsenic in soil; therefore, another arsenic exposure study in Butte is not likely to yield useful information. Even so, arsenic and mercury biomonitoring will continue to be available under the expanded RMAP when soil and dust concentrations are sufficiently elevated to warrant testing.

Community awareness, education, and medical monitoring are also critical components of the RMAP, and these actions are required in the amended record of decision. The RMAP uses community awareness and education in conjunction with medical monitoring to target affected and sensitive individuals and prioritizes sampling and remediation in locations where these people live. Awareness and outreach components include distribution of educational materials, periodic mailings, information on the Butte Silver Bow County website, information provided at public meetings, and using local media outlets. Outreach also relies on the medical community, particularly pediatricians and the WIC program to inform the public about risk, health monitoring, and other RMAP activities. Community outreach also includes participation in community health fairs and family fairs. Additional outreach and education described in the comments will be incorporated into a revised RMAP plan.

The 2006/2011 BPSOU Record of Decision specify that all properties within the BPSOU must be sampled. Prior to conducting any sampling or cleanup activities at a property, access must be obtained from the property owner. Obtaining access to all properties will be necessary, and EPA understands there are property owners reluctant to participate. Butte Silver Bow County is making a good faith effort to get all property owners to participate in the RMAP, using all means (i.e., mail, email, phone calls, and knocking on doors) to gain access. After several attempts, if Butte Silver Bow County cannot obtain access, properties will be referred to EPA and Montana DEQ for further action, including direct contact of the landowner by the agencies and the possibility of the filing of a notice with the landowner's property records indicating that the property has not been sampled or remediated. See the *BPSOU Institutional Controls*



*Implementation and Assurance Plan*, which is Appendix E to the proposed consent decree.

Once action level exceedances are determined through sampling, cleanup at a property will be implemented by Butte Silver Bow County or local contractors. The removal will be discussed with the property owner, any concerns will be considered, and a yard-specific plan will be developed and approved by the property owner and EPA in consultation with Montana DEQ. Contaminated soils in yards are typically removed to a depth of 12 inches and replaced with clean soil. Based on owner input, sod is placed over the replacement soils in yards, or seed is placed in open spaces. Driveways are typically replaced with gravel. Once the removal and restoration are satisfactorily completed, the property owner is responsible for maintaining their property in accordance with the BPSOU institutional controls program. Should post-removal issues arise, such as waste being exposed or recontamination occurring from stormwater run-on, Butte-Silver Bow County should be contacted to assess the situation for further action. Additionally, residential property owners should adhere to Butte Silver Bow County's Excavation and Dirt Moving Ordinance developed as an institutional control. However, at any time during this process, EPA and Montana DEQ are available for consultation should questions or problems arise.

The proposed consent decree clearly provides EPA and Montana DEQ the authority to lower the action levels for lead, arsenic, and mercury if the Superfund human health risk evaluations or other information indicate lower levels are needed for the protection of human health. EPA and/or Montana DEQ can require the implementation of a plan, including the lower levels, pursuant to authorities reserved by the proposed consent decree provisions.

EPA's proposed plan for an amendment to the 2006/2011 BPSOU Record of Decision proposes to expand the existing RMAP plan—the remedial design plan that implements the residential cleanup requirements of the record of decision—to residential areas outside of the BPSOU boundary upon request of any residential landowner. The expansion proposal received support from the public during the proposed plan public comment period. EPA, using its authority under the existing unilateral administrative order, has directed Atlantic Richfield and Butte Silver Bow to develop an expanded RMAP plan, which is currently in development. Atlantic Richfield has supported and funded Butte Silver Bow County's RMAP within the BPSOU area since its inception. The potentially



responsible parties have agreed to implement the expanded RMAP, once it is approved by EPA and after interaction with the public, as draft plans are developed and commented on under the existing BPSOU unilateral administrative order while the liability issues are discussed. It is possible that after CERCLA and other liability issues are resolved, the RMAP may be placed under the consent decree. Until that time, the existing RMAP is being implemented under the unilateral administrative order, and Atlantic Richfield and Butte Silver Bow County will implement the expanded RMAP under the unilateral administrative order.

Under the existing unilateral administrative order, Atlantic Richfield and Butte-Silver Bow will be required to submit a modified RMAP plan in draft. EPA agrees that this plan must address schools, parks, and other areas where children recreate as well as businesses that contain residential units. As suggested by one commenter, EPA will urge Atlantic Richfield and Butte-Silver Bow to include provisions for the maintenance of retaining walls. As EPA develops the revised RMAP plan with input from the community, it will consider the use of a urinary arsenic level of concern as part of the revised program.

## **2.26 Silver Bow Creek Legal Status**

### **2.26.1 Comment Summary**

Sixteen comments referenced Judge Neuman's ruling and/or the legal status of Silver Bow Creek.

- **Comment 2.7.** "The new proposal has eliminated Silver Bow Creek and the Silver Bow Creek Corridor from Texas Avenue to Casey Street as part of Butte Priority Soils. How crazy is this? Judge Newman wrote in the Silver Bow Creek Headwaters Coalition successful lawsuit against the State of Montana---"This litigation seeks to ensure that the State of Montana and its agencies follow the law." "In this case the Plaintiffs stand in the shoes of government. They are seeking as a private attorney general to force the State to act appropriately with respect to the State's waters held in trust for the public." Article IX Section 3 of the Montana Constitution States---"All waters within the boundaries of the State are the property of the State, held in trust, for the use of its people." Do the "rule of law" and the "Montana Constitution" mean nothing to the Environmental Protection Agency, State of Montana, Local government and the Atlantic Richfield/British Petroleum Company? I write this opposition letter to the proposed Record of Decision Amendment on



Butte Priority Soils knowing it is an effort in futility. Knowing the Environmental Anti-Protection Agency has absolutely no intension of making any changes to the proposed document and only requests input to satisfy the legal requirement to do so and appease Judge Hadden. However, I do so because I want the children of Butte and Montana to know when they are paying to rectify this mess in the years to come, that some folks in the community did in fact care!”

- **Comment 7.3.** “I. SILVER BOW CREEK CORRIDOR. A Origin. East Ridge creeks, including Silver Bow Creek are legally the origin of Silver Bow Creek through town even though the water is cut off for use by Montana Resources mining. Thus, the present, accessible portion of Silver Bow Creek begins below the mine at Texas Avenue, and are waters of the State of Montana, according to Judge Brad Newman in Silver Bow Creek Coalition vs. the State of Montana. I supported that lawsuit and am pleased to be able to cite its success, thanks to Fritz Daily, Sister Mary Jo McDonald and Ron Davis.”
- **Comment 8.3.** “Although the plan, following Judge Newman’s verdict, promises no longer to make any reference to Metro Storm Drain, or MSD, and says it will refer to that channel henceforth as Silver Bow Creek, the plan also acknowledges a willingness to include space for a future “meandering waterway” alongside the stormwater retention/detention ponds. Clearly, the community is expecting that “meandering waterway” to BE Silver Bow Creek. This raises the obvious question: which “waterway” is Silver Bow Creek? This is perhaps the most serious shortcoming of the plan, as I see it. Judge Newman’s verdict restoring the upper reach of Silver Bow Creek to its status as a water of the state is established law, but it is not reflected in the plan, and in conversations with the negotiating parties, it’s clear that they don’t accept that this reach of the waterway IS a water-of-the-state—with all the statutory protections implied by that designation. This is a hugely contentious issue and I assume that the failure to clarify this issue is by design, not by accident—ignore it and hope that it goes away. I don’t think it will go away without some attempt to confront the ambiguities of the situation.”
- **Comment 9.2.** “The standards of clean-up for Silver Bow Creek should be to a healthy standards, supporting fish and a safe play area for our children. The Creek, as ruled by Judge Newman, should start at Texas Ave. What a vision to see this creek again flowing clean



water used for family and community outings. I am sure that everyone in the Clark Fork Basin, downstream from Butte, have the same concerns.”

- **Comment 12.4.** “I also wish to address a rising sentiment that the ruling in *Silver Bow Creek Headwaters Coalition v. Montana*, DV-10-431 (Oct. 16, 2015) somehow mandates the creation of a free flowing stream. On the contrary, the order describes Silver Bow Creek as a “watercourse” and describes a watercourse as “flowing with regularity from year to year, although the channel may be dry for the major portion of each year.” Order Granting Summary Judgement at 14. The order explains the constancy of the creek’s name throughout history, but at no point does the outcome of the case mandate that a free flowing creek must be created as part of the Superfund remedy. To do so would have been far beyond the scope of the case. In fact, the order overtly qualifies that “the strict question presented involves the name of the stream.” *Id.* at 17, emphasis in original. The judgment enforcing the order is similarly narrowed to the issue of name, not the past or future existence of the creek.”
- **Comment 33.1.** “Silver Bow Creek, Yankee Doodle Creek, and Blacktail Creek formed the headwaters for the Clarks Fork River prior to the historic mining that left us with Butte as we know it today. The consent decree to finalize cleanup plans for the Butte Hill should include a natural waterway, Silver Bow Creek, to carry cleaned Berkley Pit water from the water treatment plant to Silver Bow Creek. This waterway, as pointed out by former District Judge Brad Newman, at the Environmental Protection Agency’s second and final public hearing at the Montana Tech library auditorium on May 24, is Silver Bow Creek not the “Metro Storm Drain” or the “MSD channel.” Mr. Newman said this was his decision in August 2015 on the lawsuit that Silver Bow Creek Headwaters Coalition brought against the Department of Environmental Quality over the name of the drainage ditch that runs from Texas Avenue to George Street at the confluence with Blacktail Creek. The decision was not appealed, the decisions stands and must be observed in the consent decree.

“The basic questions that need to be answered, given the previous legal decision, are where the creek begins, where it ends, and what should the flow be from the source to the confluence with Blacktail Creek. A fully restored, meandering, free flowing creek as requested



by the Silver Bow Creek Headwaters Coalition and Restore Our Creek Coalition is not unreasonable. The proposed plan and the final consent decree should include a restored, meandering creek that consists of treated Berkley Pit water that can be released into Blacktail Creek to form the headwaters of the Clarks Fork River as it was prior to historic and present-day mining.”

- **Comment 47.2.** “And so I'm not for a footprint for a creek. I'm saying we need to have the creek restored. The judgment said, by Judge Newman, it is Silver Bow Creek, it needs to continue to be Silver Bow Creek. And, Folks, we should be proud that it's the headwaters of the Columbia River. I'm not proud that it's a waste storm area. We should have a creek that we can say, "Here's where the Columbia River begins." And it follows all the way down through the corridor. We keep ignoring the fact that it's up on the headwaters. So we're going to do Milltown Dam, \$150 million. What a wonderful job you all did. But Butte was the beginning of the lawsuit for that money. Butte was the beginning. It was done for Butte, but everybody else is getting it. We have bought land for elk because they didn't know how to find their own habitat. Well, I beg to differ. I think the elk are doing very well finding habitat.”
- **Comment 52.1.** “I'm a Butte boy, born and raised. Grew up right in the Greeley area, just above the area that's being cleaned up. Spent a lot of time of my life in tennis shoes running through "Shit Creek," as it was called, and crossing the pipes so we wouldn't fall into the water and have to go home and have our clothes burned by our parents. I sit and look at what's being done here. And as a member of the Silver Bow Creek Coalition with Sister Mary Jo and Fritz, I recall Judge Newman's comments that it's sad that three citizens have to do the work of the State of Montana and our government to force that the constitution of our state is followed to give us a healthy environment and clean waterways. Silver Bow Creek is a waterway of the state, designated way back in the early 1900s. But, yet, this plan does not include Silver Bow Creek. I, myself, growing up here, fished in Silver Bow Creek. We didn't know then that you couldn't eat them. It probably explains a lot about us. But the idea that you're going to start Silver Bow Creek, basically, at the Butte Chamber of Commerce and then you're going to have this meandering stream, I kind of -- your first slide showed this beautiful creek with people walking by it. I



think it was taken in Missoula because it sure wasn't Butte. We need to have that creek. It has to be in there.”

- **Comment 58.3.** “For the record, Silver Bow Creek from Texas Avenue to Montana Street is a creek and a watercourse and not a sewer. It's not a storm drain. It's not a water feature. It's a creek, as determined by Judge Brad Newman in the Silver Bow Creek Headwaters Coalition lawsuit against the State of Montana, which I remind you was a successful venture for myself, Sister Mary Jo McDonald and Ron Davis. And, yes, we can have a creek flowing through this town. No matter what these people say, yes, we can. And we can have a creek that's attached to the groundwater, as well. As Judge Newman wrote in his -- in our successful lawsuit, Silver Bow Creek is a creek. That's what it is. Well, just so you know, what you're doing is wrong.

“But I can tell you something hear tonight that, to me, was really, really important. And it was Judge Newman. Judge Newman is a quality guy, a quality guy, who lives in this community. And what he said tonight made more sense than all of us combined made. Judge Newman told you what I said, but this came from Judge Newman. It doesn't come from Fritz Daily. It came from Judge Newman. Judge Newman told the State of Montana whether you like it or whether you don't like it that Silver Bow Creek is a creek. It's a creek. As I said in my comments, it's not a sewer, it's not a storm drain, it's not a water feature, it's a creek. That's what it is. That's what Judge Newman just told you. And in my comments I was going to tell you the same thing Judge Newman did. The State of Montana had the opportunity to go to the Supreme Court or go wherever and appeal Judge Newman's decision. But, you know what, they didn't do that. And you know why they didn't do that? Because they were afraid to. That's why they didn't go to -- that's why they didn't do that. And, you know, I get frustrated. You can see that. And I get angry. Damn right I get angry. And I'm angry with you guys. I'm angry with you guys because of my community. I love this community. I've lived here all my life. This is a great community. What you guys are doing is wrong. It is wrong. But you could do what's right. You could do what's right. Do you have the power, do you have the power to make sure that we have a creek running through this community? Damn rights you do. Damn rights you do. If you want to do it, if you want to do it, you have that power, you have that authority.”



- **Comment 62.1.** “I'm a resident of the historic Butte Hill and a citizen of Silver Bow County. In my former professional life, I was a district judge elected by the people of Butte to apply the laws of Montana in various litigation matters. I came here today to receive information. I appreciate the written materials that you folks have provided to us. I appreciate the presentation that we heard today. I hadn't prepared any comments, so I apologize if my comments here now are a little bit disjointed. But the information that I received has at least raised one or two questions in my mind.

“I was the presiding judge in the case brought by the Restore Our Creek Coalition. The interested parties to the consent decree that we're talking about in this case include the parties to that litigation, State of Montana, Montana DEQ. In that case, after hearing significant legal argument, after receiving significant evidence, the Court ruled that the area of Silver Bow Creek that had been referred to for years and years by various governmental agencies as the "Metro Storm Drain" was not a storm drain. It was Silver Bow Creek, both in name and in legal status. Silver Bow Creek is a natural watercourse. The fact that man diverted water from Silver Bow Creek for years did not change the legal status of Silver Bow Creek. Professor Ray is absolutely right, EPA cannot command action beyond what is allowed and required by law. But, by the same token, we cannot ignore what is in law. The State of Montana was a party to the case before me. The State of Montana vigorously defended the case brought by the Creek Coalition. The State of Montana spent considerable money and considerable effort in presenting their side of the case. The State of Montana, Montana DEQ, is bound by the decision in that case. They were parties to that case. They had a right of appeal. They did not appeal. That decision is legal precedent. That decision binds the State of Montana, it binds Montana DEQ, to recognize Silver Bow Creek as a natural watercourse. And so when I hear about a proposal that talks about recycling water, that doesn't sound like a free-flowing natural watercourse. I think that that consent decree with that proposal is inconsistent with the law that establishes that Silver Bow Creek is a natural watercourse. I'm going to confine my comments to that particular issue.

“I think there's much good in the proposal that we're, once again, learning about here today. But my questions are specifically directed to the parties that are bound by the decision to recognize Silver Bow



Creek as a natural watercourse, the State of Montana, Montana DEQ, Butte Silver Bow County, our government. Can they enter into a consent decree? Can they agree to a solution that ignores the law of Montana? Silver Bow Creek is a natural watercourse. The decision that I made that was not appealed by the State, that the State acquiesced in, is based on valid legal precedent, statutes, case law, the Mitchell Slough case, for example. Despite man-made alterations, when we're talking about a natural watercourse, it's not just in name only. Silver Bow Creek has legal status that must be observed by the interested parties to this consent decree.”

- **Comment 63.4.** “Because when you're talking about a creek, a creek needs headwaters. And I've heard it said to the good folks that have been fighting for Restore our Creek that there's no water source. Well, there is a water source, and it's the exact same water source that fuels pretty much any natural creek. If you start hiking at the bottom of a creek in any drainage around Butte, Montana, you will end up at a mountain lake. And that mountain lake started one of two ways, and a lot of times is a combination of two things, groundwater and storm water. And when you're getting up into where the Parrot Tailings are now, you're getting up into an area that could well be the headwaters. If it was considered, which it has not been to this point, if it was considered as part of the remedy, that could be the headwaters of a meandering creek through town. Because, really, all it is storm water that creates a lot of the creeks. It's just millennia's worth of snow melt. And, you know, you don't have to have a storm water basin there that's full immediately. But, in time, with that considered as part of the solution, that might be the headwaters of the creek that people are looking at. So I couldn't agree more with Judge Newman that that is a creek. And when that major area has not even been considered in this, I think we're leaving a lot on the table. Certainly, if I was modeling possible remedies, that would be one that I would include in my model. And I strongly encourage all the parties to not rush into a consent decree until we're going to change the standards, change the law that we currently have to enforce, until every last option has been exhausted. And that one has not.”
- **Comment 65.4.** “And then the other -- the last comment that I would like to add is just I understand the legal definition of the creek. I agree that where the creek lies historically there is a legal premises to still continue to call it a creek. There isn't current headwaters. And that --



that is a problem. There is no source of water to put into the creek. And the biggest problem primarily is water rights issues. The sources that are available are spoken for until mining operations completely subside in Butte.”

- **Comment 68.5.** “I agree with Fritz about the responsibility of ARCO for the creek from Casey Street to Texas. Because, remember, just what Sister pointed out, they modified it. You know, you own it after you modify it. And, by the way, you almost own it now anyway. But you own it, and so you own it to be made better. And technical reasons notwithstanding about technical Superfund stuff, I agree with Fritz that it's a responsibility of ARCO to deal with that area. And I agree with Judge Newman completely on that issue, that that is a creek and the whole creek is part of this problem area. And if we can dance around this thing and say, "Well, this is -- this is the BPSOU, and that was part of the other group and that was part of this group, and we've already had a settlement on this and that, and we settled something with the City, and so on." It isn't good enough. Those excuses are not good enough to not have us have a proper solution, as Sister has talked about. To reemphasize, the City land along the Civic Center needs to be modified. These are the drawings that you're advancing to the public. They show a dead end of land, green land, green identified land for a creek from Texas Avenue just to where it ends behind the Civic Center. It doesn't go to Harrison Avenue. It needs to get fixed. ARCO land. Great job by ARCO in opening up that corridor for us down in through the Northside Tailings and Diggings East. That little bit of land that you own, ARCO, that ARCO owns, immediately to the east of that little Baker peninsula of private land, should be designated as part of that corridor. In the event that we can acquire that Baker land in the future, we can be able to have that area as part of the flowing area of the creek in the future, if we so desire.”
- **Comment 74.5.** “5. The current Silver Bow Creek flow has been significantly altered in a negative way by previous actions of the EPA and ARCO/BP. Those alterations are accepted as a fait accompli by the ROD and that should not be the case. The Silver Bow Creek channel should be returned to its original use. It should not be dedicated solely to storm water movement. The ineffective French Drain should be removed and the plan from 2006 to modify the straight channel into a meandering creek should be restored and done no matter what the cost. Judge Newman in his decision firmly stated



that the channel was always Silver Bow Creek and that it is a waterway of the state. Attendant to being a waterway of the state are certain rights. It should not be a captive to ARCO's commitment to lowest cost storm water treatment. If the storm water was to go the Berkeley Pit, then this channel could be returned to the kind of creek it was before mining, and even made better. That should be the goal. (By the way, ARCO took on the full risk when it first did the French Drain because it was a choice they made that was not a mutual choice with the EPA and thus they took the risk that it could fail or not achieve optimum performance. While it may take a lot to restore the channel, I believe the "Auction Barn Rule" applies here: "If you break it, you own it." ARCO, as a result of their previous actions and the actions of its predecessor ACM – remember retroactive liability in the Superfund law - has broken Silver Bow Creek and bears the full responsibility to its remediation and restoration."

- **Comment 80.6.** "I disagree with the characterization of the name "Silver Bow Creek" to the current location of the creek as defined by the lawsuit defining the creek as such. Since this reach is now defined as an "ephemeral creek" which is only fed by stormwater events, it is not what I consider a waterway of the State of Montana. I understand the decision has been made through the lawsuit, but don't agree with the decision as it is not what I consider a natural year-long creek as it is below its confluence with Blacktail Creek."
- **Comment 98.13.** "D. Regulatory Status of Upper Silver Bow Creek (formerly Metro Storm Drain). The Proposed Plan refers to the historic SBC channel / SBC stormwater channel as "upper Silver Bow Creek," rather than "MSD" or "Metro Storm Drain" as the agency did in the 2006 ROD and 2011 ESD. See, e.g., Proposed Plan at 19 (Minor Modification No. 13). This change in terminology is predicated on the 2015 State of Montana court decision issued in Silver Bow Creek Headwaters Coalition v. State of Montana, DV-10-431 (August 17, 2015). In this decision, the court held that the legal name of the then described Metro Storm Drain (i.e., the constructed storm water channel between Texas Avenue in Butte and the confluence of Blacktail and Silver Bow Creeks) is "Silver Bow Creek," because the former SBC channel had not been renamed in accordance with the State's 1911 watercourse name change statute. AR anticipates that members of the public will cite this 2015 decision in comments that support their belief that the former SBC channel is a "water of the



State” subject to Montana water quality standards and claim that the former creek channel should be restored in order to achieve such standards. Any such comments are unfounded, as they conflict with the Montana Water Quality Standards (WQ Standards) and the ROD, as well as the court’s 2015 decision. For these reasons, which are further described below, AR requests that EPA clarify in response to any such public comments that the change in terminology applied to the former “Metro Storm Drain” does not have any regulatory impact on the channel, including that it does not establish that State surface water quality standards apply to the channel or mandate that this historic stretch of SBC be restored as part of the BPSOU remedy.

“First, State law explicitly excludes the upper SBC stormwater channel (above the confluence of Blacktail Creek and the stormwater channel) from regulation under the WQ Standards. The WQ Standards classifying the Clark Fork Columbia River drainage—which includes Silver Bow and Blacktail Creeks (class “B-1” waters)—explicitly state that “[t]he concentrator tailings pond and Silver Bow Creek drainage from this pond downstream to Blacktail Creek and the tailings ponds at Warm Springs have no classification.” ARM 17.30.607(1)(a)(iii) (emphasis added). This exclusion was codified into State law for the entirety of the SBC stormwater channel, to ensure that the constructed channel located in the area of the historic creek bed is not a “state water” that is required to meet State WQ Standards. This stormwater channel was excluded from the requirement to meet surface water standards partly because, for many decades, government and industry dedicated the channel to the efficient transport of a mixture of municipal wastes and mine water from Butte to the Warm Springs Ponds for treatment, and partly to support diversion and use of the SBC headwaters streams (the upper portions of Silver Bow Creek, Dixie Creek and Yankee Doodle Creek) for mining operations that began in the 1950’s when the Berkeley Pit opened, and that continue today with on-going mining in the Continental Pit. Without a natural headwaters to provide a source of surface water, the former SBC channel from Texas Avenue downstream to the confluence with Blacktail Creek no longer functions as a natural creek, and CERCLA does not give EPA the authority to require AR to supply another source of surface water to re-create or restore a creek in this location. See CERCLA, 42 USC § 9607(f)(1) (claims to restore natural resources must be brought by



natural resource trustees; EPA is not a natural resource trustee for BPSOU).<sup>4</sup>

“Second, the 2006 ROD does not require remediation within the storm water channel to restore the beneficial use of any water resources that still exist in this unclassified stretch, as the WQ Standards were not identified as an ARAR for this area. See ROD, App. A (identifying the WQ Standards, ARM 17.30.607(1)(a)(iii), as an “applicable” state requirement for Sliver Bow Creek (mainstem) and Blacktail Creek, but not the MSD/historic SBC channel); *id.* at 8-5 (“The Metro Storm Drain (historic Silver Bow Creek channel) . . . has no regulatory classification.”). Thus, the ROD also establishes that the historic SBC channel is not a state water that must comply with the WQ Standards. Finally, the 2015 court decision itself undermines the assertion that waters in the former SBC channel must meet WQ Standards. The court’s holding decided only that the legal name of the “contested stretch” is “Silver Bow Creek,” not “Metro Storm Drain,” because “there has never been any formal procedure to change the name [under the 1911 statute].” Opinion at 1-2, 23-26. The court did not hold that this stretch of SBC was subject to the WQ Standards, and, in fact, the court’s opinion states that issues related to cleanup obligations or standards in SBC “are of little significance to the issue at hand.” *Id.* at 33. AR is aware that Judge Newman, who wrote the 2015 decision, offered a different interpretation of his 2015 ruling in his public comments at the May 23, 2019 public meeting on the Proposed Plan (as well as other public forums). However, the judge’s comments are not part of the ruling and are not law. The 2015 decision does not hold that upper SBC is a state water that is subject to and must comply with state WQ Standards.”

## 2.26.2 EPA Response

In 2015, a state district court found that the official geographic name for the drainage above the confluence of Silver Bow Creek and Blacktail Creek under Montana law is Silver Bow Creek. See *Silver Bow Creek Headwaters Coalition v. State of Montana* DV-10-431. Prior to the ruling, EPA and other federal, state, and local authorities had referred to the drainage as the Metro Storm Drain because it gathered and conveyed stormwater. The perennial water flow that composed Silver Bow Creek before mining activity is now intercepted by the Yankee Doodle Tailings Dam, the Berkeley Pit, and Montana Resources, LLP’s permitted active mine area. The court ruled that the use of the term “Metro Storm Drain” as opposed to “Silver Bow Creek” did not follow the geographic naming statutes that governed official names of geographic areas in Montana. Because



the court issued its ruling, EPA and Montana DEQ have described the area in question as Silver Bow Creek above the confluence with Blacktail Creek or upper Silver Bow Creek in Superfund documents. The court's ruling, however, did not determine that the drainage in question was subject to state water quality standards. The district court's decision was narrow and limited to the proper name for the drainage, which the court stated was the only issue raised in the plaintiff's complaint in the matter. As the court's decision states, issues related to the cleanup obligations or water quality standards in this area "are of little significance to the issue at hand." Therefore, the court's ruling does not require a replacement creek be constructed in the area above the confluence of Silver Bow Creek and Blacktail Creek.

The relevant and current Montana DEQ regulation concerning this stretch of Silver Bow Creek is found at Administrative Rules of the State of Montana (or ARM) Section 17.30.607(1)(a)(iii), which states that "the concentrator pond and Silver Bow Creek drainage from this pond downstream to Blacktail Creek . . . have no classification." The same regulation prescribes water quality standards for Silver Bow Creek downstream from its confluence with Blacktail Creek. EPA's Superfund remediation authority is partially dependent on the applications of state water quality standards to specific surface water areas and therefore is constrained such that EPA cannot require the settling defendants to replace Silver Bow Creek above the confluence where the channel is now being used to convey contaminated stormwater.

While EPA has determined that it does not have the authority to require responsible parties to replace the Silver Bow Creek channel above the confluence with another channel for recreational use under Superfund remediation authority, it has taken several important actions to improve the area above the confluence. First, EPA has worked with the community to obtain voluntary commitments from Atlantic Richfield for end land use development in this area that will include park-like features for use by the community. The State of Montana also agreed to set aside in an interest-bearing account some money obtained in the proposed consent decree that is not used for implementation of the Blacktail Creek area remedial work for use by the community for the design and construction of a lined creek. Such funds would be used as a match for other funds secured by the project proponent if land, water, access, infrastructure, and other issues are resolved at the time a proposed project is presented. The agencies believe the end land use plan will include an area that could support a new lined creek should construction funding and water become available. The creek would have to be lined to prevent the infiltration of surface water in the creek through the streambed and underlying remaining contaminated soils into groundwater and impacting Atlantic Richfield's groundwater remedy. Second, EPA awarded a grant to the Silver Bow Creek/Butte Area Technical Assistance Group to review how such a creek could be constructed in conjunction with the proposed



remedy. Finally, the state has agreed to set aside funds from a proposed consent decree that could contribute to the development of a lined creek in this area.

## **2.27 Silver Bow Creek above the Confluence Channel Replacement**

### **2.27.1 Supports Proposed Plan**

#### **2.27.1.1 Comment Summary**

Five comments were received in support of the remediation of Silver Bow Creek below its confluence with Blacktail Creek as described in the proposed plan. Two of these commenters raised issues regarding request for a meandering creek in the area of Silver Bow Creek above its confluence with Blacktail Creek.

- **Comment 18.3.** “Sadly however, I am disappointed with a small but vocal faction of our community. I fear they could spoil the end results that you have proposed with their constant negativity and their lack of appreciation for all of your work done in the past, the present and into the future. I am not an engineer or a scientist but I understand why Butte is called The Richest Hill. The need for a synthetic creek; as a few fellow citizens persistently demand, seems to me to be of little to no importance relative to the more pressing need to capture and to treat the storm water run off from this-Richest Hill-laden by naturally occurring heavy metals.”
- **Comment 22.8.** “4.3 CTEC is pleased that the ROD Amendment will remove the option for flow augmentation to attain water quality standards. The ROD allowed “In-stream flow augmentation as appropriate. Flow augmentation will not be considered until the major remedial components described in this ROD are designed and implemented.” Removing that option puts additional emphasis on using remedy to meet standards rather than using dilution. It also encourages the agencies to require additional remedy at the end of the 9-year compliance determination period. Additionally, CTEC has always assumed that Silver Lake water would have been considered for augmentation. That would have been a misuse of a critical water source that must be used for our current industries and industrial growth for Butte in the future.”
- **Comment 29.3.** “Expanded Waste Removal/Rerouting of Silver Bow Creek. Soil-bound contamination poses the largest, long-term threat to groundwater and surface-water quality in Upper Silver Bow Creek. As such, the CFC supports additional waste removals at the Diggings East, Northside Tailings, Blacktail Creek and the Butte Reduction



Works areas along with the plan to expand groundwater capture areas west and south of the BPSOU Subdrain. In addition, the CFC fully supports the plan to reroute the channel of Upper Silver Bow Creek out of the Slag Wall Canyon and remove additional wastes from this area. The proposed modifications to the ROD will help facilitate a more comprehensive cleanup of Upper Silver Bow Creek. In the not so distant future, Silver Bow Creek will likely be reconnected to the upper Clark Fork River directly. With millions of dollars already invested in restoration and remediation actions downstream of Butte, it is imperative that water quality is maintained at the headwaters. Upper Silver Bow Creek Flow Restoration.

“The CFC is aware of significant efforts to advocate for a free-flowing, meandering stream in the upper reaches of Silver Bow Creek above the confluence of Blacktail Creek. The CFC takes no position on the aesthetic remedy ultimately implemented by the ROD, other than to reiterate its support for stormwater retention controls outlined in the proposed amendments to effectively manage the significant negative impacts posed by runoff during storm events. The CFC supports efforts that will improve water quality in Butte and provide benefits to aquatic ecosystems downstream. As such, CFC supports the current proposal’s removal of artificial flow augmentation in order to help achieve water quality standards or desired aesthetic flows. CFC agrees with CTEC’s comment that removal of artificial flow augmentation properly “puts additional emphasis on using remedy to achieve standards rather than using dilution.” Improvements in water quality should be achieved through restoration and remediation, not through dilution or the use of trans-basin diversions. The Upper Clark Fork River already faces significant negative impacts from low flows and high temperatures created by seasonal dewatering of key tributary streams. Rather than see these impacts exacerbated by trans-basin diversions, CFC would like see future emphasis placed on proven, effective methods aimed at restoring and protecting water quality to key tributaries, including Silver Bow Creek.”

- **Comment 65.11.** “I do believe, if I'm not mistaken, that there was money that is being set aside in an interest bearing account for the future feasibility study of the creek corridor and construction. Is that correct? Okay. So that should -- that should be very much on the record. When the water source becomes available during the subsidence of all of the mining operations, and Silver Lake is open



and you can get to the Yankee Doodle and to the other headwaters, when those are not under ownership of water right, the money's going to be in an interest bearing account for those feasibility studies to be done and for the construction of the site. And I agree with some people we might want to know now, but there is some barriers that make it questionable if that's a good use of the taxpayer's dollars when there's no water to put in the creek. And that's just factual. You can't put groundwater in it. That doesn't work. The groundwater's contaminated. There's a reason the storm drain's there. So thank you guys. And, endly, I want to really legitimately thank ROCC, the Clark Fork Coalition. None of this where we are at, none of these amenities, would exist without your work. And so I'm not here to argue with you. I'm here to compliment you and to say that at some point in the future I think a concession is necessary, and I think it should be necessary now.”

- **Comment 98.14.** “E. Community Requests to Restore Upper Silver Bow Creek. Similar to the previous comment, AR anticipates that some public comments will suggest that EPA, the State, BSB County, and AR have dismissed and/or failed to adequately consider community requests and desires relating to restoration of SBC, particularly those presented by the Restore Our Creek Coalition (ROCC). In 2016, ROCC presented the community with their vision for the creek corridor. ROCC’s plan outlined three main tenets: remove tailings from the Silver Bow Creek corridor, build a park, and partially restore the wetland and riparian areas by constructing a creek channel that is lined to separate and “protect the restored creek and wetlands from potential recontamination by groundwater,” and by adding riparian vegetation and trails to the creek corridor. See ROCC Vision at pp. 80, 84, 86, 92.

“EPA, the State, BSB County, and AR have individually and collectively met with ROCC members many times since 2016 to listen to their concerns and desires and discuss ways to incorporate ROCC’s ideas into the proposed remedy. If the remedy modifications identified in the Proposed Plan and the related land-use plans (which would become part of a final CD) are adopted, several of the items ROCC envisioned will happen. As described in the Proposed Plan, buried tailings would be removed from the majority of the creek corridor. And if the associated end-land-use plans are adopted as part of a final CD, large areas of barren land would be transformed into areas planted



with native vegetation, interconnected with new and expanded green space adjacent to the riparian corridor formed by Blacktail and Silver Bow Creeks. Although the BMPs that manage and convey storm water from Butte Hill are not a creek, the proposed remedy would configure the stormwater basins to look like a series of landscaped wetlands that will be an attractive community amenity while meeting the primary objective of improving water quality, if operated in the manner proposed by AR. Further recreational benefits would be provided by a fishing pond, and significant portions of Blacktail and Silver Bow Creeks would be remediated and reconstructed. AR also comments that it (as well as the other CD parties) understands and appreciates ROCC's desire to create a segment of Silver Bow Creek that would begin at Texas Avenue and continue down to the confluence with Blacktail Creek. However, there are practical and technical limits to what can be achieved in this area. Where a creek once existed, a mine has been developed and a city has grown. There are multiple landowners, buildings, streets, pipelines, utilities and other infrastructure, including the storm water system required as part of the remedy, throughout this area. Further, there are no headwaters to provide a source of water for a restored, natural creek. It is not feasible to use the remedy to return this area to the condition it was in 150 years ago, before mining began and before a city was built on top of it.

"If land is identified and acquired and infrastructure could be moved, a lined stream compatible with and not impairing or impeding the function of the remedy, could be constructed by others, potentially beginning at Casey Street. Any stream in this area would have to be lined to keep metals in groundwater out of it, and to allow the necessary groundwater capture-and treatment system to function effectively to protect Blacktail and Silver Bow Creeks. The concept of a lined creek is not part of the Proposed Plan as it would not be done for remediation purposes, but the remedy design includes an area that is set aside for the potential construction of this project, if the State of Montana and the community want to provide funds for this purpose and to operate, repair and maintain such a feature as a community amenity. AR understands that EPA is considering funding a technical assistance grant for a conceptual feasibility study for a lined creek in the SBC corridor, which would be overseen by CTEC, in coordination with ROCC and other community members. If this occurs, this EPA grant would satisfy another of ROCC's requests.



The community of Butte is very important to AR, and we are part of the community. AR acquired The Anaconda Company in 1977 and merged with it in 1981, and AR's employees and contractors have been working and living in Butte and surrounding communities with their families since that time. The company is dedicated to working alongside EPA, BSB County, and the State to implement a final environmental remediation and clean-up plan that will protect human health and the environment, while providing additional benefits to the Butte community.”

#### **2.27.1.2 EPA Response**

Support for the remediation of Silver Bow Creek below its confluence with Blacktail Creek as described in the proposed plan is noted, including additional contaminated groundwater capture in these areas and the addition of significant stormwater controls to protect surface water quality in this body of water and Blacktail Creek. EPA notes Atlantic Richfield's extensive work with Restore our Creek Coalition and other community groups to develop and voluntarily commit to the implementation of a robust end land use plan for Silver Bow Creek above its confluence with the Blacktail Creek area.

As for the stormwater control features required by the BPSOU Record of Decision Amendment, the amended Record of Decision requires the implementation of large stormwater detention/retention stormwater control basins in the SBC-Above the Confluence area. Two areas with mine wastes—the Diggings East and the Northside Tailings—will be excavated from the ground surface to the high water table elevation within the most recent three year period and the stormwater basins will be installed in those areas. Any tailings, waste or contaminated soils excavated will be transported to and disposed in a repository. The basins will be lined to prevent infiltration of stormwater to groundwater. These remedy components are necessary to address the environmental threats from mine waste-contaminated stormwater that runs off Butte Hill during storm events into Blacktail Creek and Silver Bow Creek below the confluence. These threats were identified as unacceptable environmental risks in the ecological risk assessment prepared for the BPSOU site. The basins will hold significant volumes of contaminated stormwater during and after storm events, allowing contaminants to settle out before the stormwater is released to Silver Bow Creek.



As noted above, Atlantic Richfield's end land use plans to be implemented voluntarily by the settling defendants will include park-like features in the area around these basins in accordance with community plans for the use of this area. The end land use features will be fully compatible with the stormwater control basins.

## **2.27.2 Against Proposed Plan**

### **2.27.2.1 Comment Summary**

Thirty-five comments were received that were against a proposed plan that did not include a replacement or reconstruction of the Silver Bow Creek above its confluence with Blacktail Creek because the existing channel will be utilized for moving contaminated stormwater to the stormwater treatment basins. Most of the commenters want a meandering creek from Texas Avenue to where it joins with Blacktail Creek as it historically existed. Some commenters thought that a meandering creek in the entire corridor from Texas Avenue was not possible owing to private land ownership but that treated water from the Butte Mine Flooding Operable Unit could be discharged farther downhill near the Stokes property and that flow could be a water source for a new creek channel that would enter Blacktail Creek. Commenters also requested that the 2020 BPSOU Record of Decision Amendment include language that is supportive of the Restore Our Creek Coalition's vision for a new creek channel. Several people requested that a feasibility study on creek construction be conducted.

- **Comment 6.1.** "As a decades long resident raising my family in Butte, thank you for the efforts in finally cleaning up the Silver Bow creek corridor in Butte. It has been a long time coming but the people of Butte deserve a naturally flowing, actual creek like the one that was there before mining devastation. I strongly oppose the plan to create a lined "water feature" because this is NOT restoration and not an acceptable replacement for the headwaters of Silver Bow creek. While I appreciate the boardwalks, recreational buildings, park features, amphitheatre, and fish ponds, I feel these are a diversion from the fact that the EPA is not willing to restore our creek. I'd rather see a natural creek than all the other man made features for the sake of our environment. The people of Butte have suffered endless pollution and harmful man made environmental damage long enough, please restore Silver Bow creek to it's pre-settlement condition!"



- **Comment 7.4.** “B. Missing Piece of Creek. The BPSOU ROD Amendment does not address the portion of the creek from Texas Avenue to the Civic Center and Harrison Avenue. Please explain in the Responsiveness Summary what is planned for that area and how citizens might comment on those plans. E. Obstacles to a clean lined meandering creek. ... 11. The ROD Amendment indicates a clean lined creek may flow west of Harrison Avenue. There are both physical infrastructure and legal process (land ownership) impediments to be overcome for this to become reality. To prove to the people of Butte that the Proposed Plan Amendment does not preclude even this type of creek, EPA must require a feasibility design be completed and included in the forthcoming Consent Decree.”
- **Comment 8.4.** “I ask that the plan be modified to acknowledge not merely that the name of the existing channel is properly Silver Bow Creek, but that the plan explains to the residents of Butte what that means in terms of their expectations to see the creek restored. If it’s not a “real” creek, what is it? To address the ambiguities of this situation, I propose that, as an alternative, the lined channel that has been discussed be designated as a “temporary or provisional channel” of Silver Bow Creek that is designed to carry at least 2-3 cfs of clean water in a meandering path alongside the constructed stormwater wetlands. This would serve to implement bullet #2 on page 5 of the proposed plan (Remedial Objectives...), “Return surface water to a quality that supports its beneficial uses.” This connects stream restoration directly to the stated remedial objective. It starts us on a decades-long path to genuine long-term restoration, and provides legitimate cover to account for two channels of Silver Bow Creek (as was most likely the case when beavers, not bureaucrats, were managing the creek).”
- **Comment 20.2.** “For the record, while council authorized the executive branch’s request to submit their comments, I do not wholly agree with the comments and I believe there are several commissioners who feel the same. The folks in my district have voiced their opinions to me and as their elected representative, I must support them. They (and I) desire a full cleanup and restoration of the entirety of Silver Bow Creek beginning at Texas Ave. It is beyond me why the negotiating parties are resistant to what seems like a pretty simple “ask” in relation to a project with such a massive scope. Public opinion supporting the cleanup and restoration of Silver Bow Creek



has been very apparent over the years. It cannot and should not be ignored.”

- **Comment 22.7.** “4.1 The Proposed Plan should require a Feasibility Study to evaluate integration of the proposed stormwater controls and groundwater remedy with a restored Upper Silver Bow Creek. The Butte community has been clear in their goal to see a restored meandering Upper Silver Bow Creek. The proposed stormwater control system appears to many citizens to be a continuation of using the creek as the “Metro Storm Drain” under a different name. The community deserves to understand how the proposed remedy can be integrated with the restoration of Upper Silver Bow Creek. The proposed stormwater system appears to leave little room for the eventual restoration of an important state waterway.”
- **Comment 30.3.** “Restoring Silver Bow Creek as a flowing stream from Texas Avenue to the confluence at Blacktail Creek. The EPA has stated repeatedly that they cannot require the creek be restored as it is not remedy. As a protector of the health and “the environment”, it seems logical that we have sustained a lost environmental resource due to mining activity, i.e., a flowing Silver Bow Creek through the center of town. Before open pit mining began in the Berkley pit, the creek was flowing. After the pit began operations, the creek was severed and no water from it flowed through town again. As one definition of remedy is “to restore to the natural or proper condition; put right”, it seems that restoring the creek to its natural condition through town is in fact “remedy”. Thus, RESTORING THE CREEK LANGUAGE SHOULD BE INCLUDED IN THE ROD AMENDMENT. Also, statements by EPA officials have said that “the proposed plan would not preclude a creek in the corridor”. As a result, language needs to be included in the ROD amendment to assure that in fact a flowing creek in the corridor can be designed and accomplished in conjunction with all the other plans for the area.”
- **Comment 33.2.** “To bring Silver Bow Creek at the north end of Texas Avenue, below the water treatment plant is probably not feasible or reasonable given all of the private land between the north end of Texas Avenue and George Street. This would require the purchase of private properties, take a long time to acquire the private properties, and cost a lot of money that would be better spent on the new Silver Bow Creek corridor through Butte as envisioned by Restore Our Creek Coalition. The water treatment plant will be up and running this summer and



full-time treatment of Berkley Pit water will begin within 4 years. Water for Silver Bow Creek could originate from the Water Treatment Plant just east of Continental Drive. This water could then be piped to the vacant land west of Stokes Market. From there it should be a meandering, free flowing creek that enters Blacktail Creek upstream of the KOA campground. It is not unreasonable to think this cannot be done.

“Five million gallons of water equates to a flow of approximately 8 cubic feet per second (CFS). This would be considered base flow and would not vary throughout the year as a natural stream would do during spring runoffs and rain events. Eight CFS flow would be similar to the summer flows of Blacktail Creek. It is not unreasonable to think a meandering, free flowing Silver Bow Creek the size of Blacktail Creek in the summer could not begin on the vacant land west of Stokes and enter Blacktail Creek upstream of the KOA campground. This natural free flowing stream could provide the proposed park amenities Restore Our Creek has advocated for throughout their meetings with the EPA. The five million gallons of treated Berkley Pit water will meet Department of Environmental Quality water quality standards before being released into Blacktail Creek. Five million gallons (8 CFS) of treated water would also exceed the combined flows of Yankee Doodle Creek and Silver Bow Creek (estimated at a little more than 1 CFS) above the Yankee Doodle Tailings Impoundment.

“A feasibility study as requested by the Restore Our Creek Coalition (May 21, Montana Standard) would help provide answers to some of the questions Restore Our Creek has raised recently as well as some of the questions the public has raised at recent public meetings. Where the water comes from is simple. Five million gallons of treated Berkley Pit water needs to get from the Berkley Pit to Blacktail Creek within four years. How it gets there does not have to be complicated. The State of Montana and local environmental contractors have been removing streamside tailings, designing, and constructing streams downstream from Butte for over 20 year as part of the Clarks Fork River cleanup. Designing a meandering, free flowing creek that begins just west of Stokes Market and enters Blacktail Creek upstream of the KOA campground can provide a conduit for treated water from the Berkley Pit to Blacktail Creek, many of the amenities Restore Our



Creek has been advocating for, and the clean healthy environment the citizens of Butte and future generations deserve.”

- **Comment 34.3.** “2. It would be really great to make it possible for Silver Bow Creek to be restored into a flowing creek. At the very least, the plan should include a thorough evaluation of the possibilities to reestablish a creek.”
- **Comment 38.4.** “Water features in the Silver Bow Creek corridor are absolutely useless and truly an insult to the citizens of Butte. I have circled the features that an ARCO employee drew on the map showing the features on either side of the Silver Bow Creek channel. They are ditches that will have 1 cfs of water flowing back and forth. With evaporation there would be the need to add municipal water to keep them at 1 cfs of water. A waste of city water and a feature that most people will see them for what they are -Disney Land water feature that will not enhance the corridor and as there is not connection of the two features a meandering creek it will not make. Save the money and do a real creek from Texas Ave to the confluence. The State employee drew in the water feature behind the Civic Center. A ditch with 1 cfs of water in it that will need to have water added to keep it flowing does not a creek make. I feel that such a water feature is an insult to the citizens of Butte who have waited 30 years for a proper cleanup - one that is truly ascetically pleasing and truly can be enjoyed by all. After all this is the center of our city. People in Butte spend a great deal of time taking care of their yards. So too should the reclaimed areas need to be such that all will be proud to spend time enjoying. Butte should not be ashamed of the cleanup that is to occur throughout the city and it should be a thorough cleanup with Silver Bow Creek restored and all the tailings removed from the Northside tailings, Diggings East tailings, the Butte Reductions works contamination removed and the Blacktail Berm remediated and restored. The corridor from Texas Avenue to the confluence needs to be totally restore and remediated so that it is a proper channel for Silver Bow Creek.

“Water will be more abundant now that the pit must be drawn down a possible 150'. So obviously for the next 10 years there will be an over abundant source of water. ARCO plans to release this water at Casey Street flowing into a pipe that will carry it to the confluence and release it there. (It is questionable as to whether the pipe will be able



to service the 30 million gallons expected to be released from the polishing plant and the treatment plants.”

- **Comment 39.1.** “These material enclosed are from the documents that were published results of what ARCO did to the Silver Bow Creek Bed. They obviously decided to reconstruct the bed and prepare it to receive the effluent water from the Horseshoe Bend treatment plant to allow the water to flow through to the confluence. Obviously ARCO found the water that was needed to have the necessary flow for Silver Bow Creek. They projected a flow of 7 MGD or 10.8 cfs or 4,900 gallons per minute of water for the channel. ARCO also promised wonderful aesthetics surrounding the reconstructed channel. The reconstruction did not work as they projected so they abandoned the project. ARCO needs to redo the project so that Silver Bow Creek flows from Casey Avenue to the confluence as they had planned to do with the reconstructed channel they created. It's time for the EPA to call ARCO to accountability for the redo of Silver Bow Creek. Obviously they found the water in 2003 -2005 for their project. ARCO did this under remediation and hence tells all if you touch it you own it. Well ARCO owns it so they need to touch it and create Silver Bow Creek a free flowing creek throughout the Channel. Easements are already in place where private owners are involved. I have the copies of two and it is possible to get the others at the Court House.”
- **Comment 41.3.** “I believe not restoring Butte-Silver Bow Creek to a quality creek where children can play and fish and the adults of the community can enjoy the amenities of the cleanup, as well, I believe that this is a terrible decision. We need to make sure that we have a creek flowing through this community. That's what the people in this community have asked for. That's what the people in this community want. That's what the people in this community deserve. Nothing more, nothing else. And anyone that tells you, and I know there are people in this room that will do this, but anyone who will tell you that you cannot have a creek flowing through Butte is not telling the truth. They're not telling the truth. Because you can have a creek flowing through Butte again. And what's happening now in Butte is that for 100 years now, 100 years of mining, what's happened is we've dewatered the mine. We dewatered the mines to where we're down to 1,000 feet from sea level. That's where we are. Now what's happening is the water's returning. And the water's going to be the same exact amount of water that we had before mining began is going to be there



once again. So, yes, you can have a creek, EPA, yes, you can. And, yes, you should have a creek. And to not have one is wrong. It's just wrong.

“And, you know, there's absolutely no question under Superfund law, State of Montana and Montana constitution who's responsible. The Atlantic Richfield/British Petroleum Company is responsible. That's who's responsible. They're the number one responsible party. The reason they are is because they made the decision. They made the decision to close the smelter. They made the decision to let the mine flood and the Berkeley Pit flood. They made that decision. They made the decision to end mining in Butte. They're the ones who did that. They made that decision. They're responsible. The EPA should take them to task and make sure they do that. I know they're not going to, and then, probably, my effort here tonight is an effort in futility, but I want it recorded. And I'm offended to learn that any agreement in principle that ARCO'S been taken off the hook. And Sister Mary Jo mentioned this just a little bit ago. I'm offended. I'm offended that they've been taken off the hook for the cleanup of Silver Bow Creek from Casey Street back to Texas Avenue. I'm offended by that. I'm more offended by the fact that the EPA is now telling us, "If you don't accept this decision" -- and I feel sorry for the Council of Commissioners. I feel sorry for you guys, actually. Because what they're telling you is if you don't accept this rotten opinion or this rotten decision -- let me rephrase that. "If you don't accept this inferior decision, what we're going to do is give you a worse inferior decision." I know that's not good English, but that's what we're doing.”

- **Comment 46.3.** “Furthermore, when you talk about public input as being a justification for including things in this ROD change, some words, some language, some words that count in this ROD change, ROD amendment, the biggest thing that has been called for by public input is the restoration of the creek. Make no question, no bones about it, removal of the tailings goes hand in glove with restoring the creek. But restoring the creek was the driving force. So, we're kind of ignoring that when we talk about public input, and we shouldn't be doing that. From the get-go when the conceptual, the agreement in principle, came out, discussions about restoring the creek have been held repeatedly, over and over and over again. Assertions have been made by every agency. Martin, you were the first one that said nothing in this will preclude a creek. And from that point forward, at every



meeting, we had words that nothing in this will preclude a creek, nothing will stop a creek from being in there. But when we asked for an effort to prove those words, that they're more than just rhetoric, it hasn't happened. So, what we have is a rhetorical assertion about the creek being restored in this area. And we talk about public input. And the public input has been predominantly about restoring the creek. And, yet, continuing, not one document produced, not one document produced in this entire process, for 15 months, has ever had a restored creek shown in it, including those paid for by ARCO combined with Butte-Silver Bow, hiring the good folks out of Billings to come in here and design something. Just surprised the words "creek" don't appear. The words "creek" don't appear anywhere. Do we feel, do I personally feel, like maybe we're being kidded, we're being misled maybe? All we have is rhetoric. I've been working in the public arena for 50 years. There's got to be more than rhetoric. There's got to be some reality in it. The word has never appeared on a document, in terms of restoring a creek, going through Northside Tailings subject of this document, going through the Diggings East subject to this document. No reference to it. But public input supposedly has called for sediment ponds. A misrepresentation of that public input.

I'd like to address the issue that in the documents on the Major Substantive Change No. 3 and in the -- on Page 11, Table 2, the third item on Table 2, both of those refer to removing the mine waste to construct storm water controls. And then, in both places, in italicized print, it says this is being done in response to public input. I am pleased that the parties are responding to public input. But it's misrepresenting the situation to suggest that public input was about, significantly about, storm water basins. Now, maybe agencies want it and whatnot, but I have been to all the meetings with all the people of Butte, and I haven't heard a great big hue and cry about wanting to have storm water basins. Now, maybe they proved to be required for some reason or another, but they're not being asked for by a groundswell of opinion from the people of Butte. The public input was about the tailings, which happened, among other things, to make room for storm water basins. But they do more than that, so that when a lot of us were out there championing the cause of removing the tailings and restoring the creek, those two went together. And when the agreement in principle was announced and it was said that tailings were now going to be removed, we all applauded that. It was being done because they didn't belong -- they didn't need to stay there,



notwithstanding the contentions of the EPA and ARCO. By the way, the State always argued that they ought to be removed. But, notwithstanding the contention for all those years that they didn't have to be removed, suddenly the decision was made. And it was an enlightened decision, and we appreciate that. I personally appreciate that enlightened decision to remove the tailings. Okay. And it wasn't solely for the purpose of creating storm water basins. Because many of us that appreciate the removal of the tailings aren't that happy about the storm water basins. They may prove to be necessary, but I think it's misrepresenting -- the language misrepresents the circumstances.

"We need to have this creek recognized in the ROD, given that we're recognizing the importance of public input and we're dealing with the geography. So I suggest that the language that's going to be put in on Page 20 -- or Page 11, Table 2, and also on Item No. 4, moving mine waste, under the significant proposed changes, that we add some language in there, and that we add language that says that we will provide space -- maybe I'd rather say "allocate" -- allocate space to allow a future restored creek to run through the Northside Tailings and the Diggings East."

- **Comment 49.4.** "So I hope that in your ROD that you can recognize that, indeed, the creek would start right there at Texas Avenue, or right there below the pit, because that's where the drainage is. And that's -- it's just kind of commonsense that that's where a stream would start and that's where it was. And we modified it. We modified it. And everybody accepted that. But I think that in the future, if we don't look at integrating at all, it would be a mistake."
- **Comment 58.2.** "As I stated at the last meeting and wrote in my comments to the EPA, I believe it is totally wrong, it's wrong, that ARCO and British Petroleum Company has been taken off the hook for the cleanup of Silver Bow Creek from Casey Street to Texas Avenue. I believe it's totally wrong that we, as a community, and the Council of Commissioner members who are here tonight are being told, "If you don't accept this inferior cleanup we're going to give you a worse one." How about that? How crazy is that?"
- **Comment 66.1.** "What I brought here today -- I am coming as a member of the Silver Bow Creek Coalition. And we are the ones who worked hard to get the name of Silver Bow Creek restored. And I have brought with me three documents, and they date back to 2003. And it



was when -- And this was not during your time, Loren. You're off the hook. This 2003, when ARCO decided to take the metro storm drain and to redo it, and they changed the shape of the channel. They made a trapezoid out of it, and then they incised the bottom of that channel so that it would -- they call it a free-flowing brooks -- what is that? Help me Norman. Storm brook -- no. Anyway, it's not important. But they did that. And they did it so that the effluent from the Horseshoe Bend Treatment Plant could be released into that and flow down because the assumption was it was good water, it will be fine, but what they discovered is it wasn't fine, it became contaminated. But they did redo that channel that today is Silver Bow Creek. So, if that channel can be redone in 2003, I hunch with all the latest in engineering, etc., etc., that in 2019 it can be reconsidered as a possibility and that we could have a restored creek.

“The one thing that the plans promised, and there was one document that was a paper presented in Billings touting the wonderfulness of the plan and how it was carried out and the results, has about aesthetics, the wonderful aesthetics that would be created. And there would be grasses planted, and trees would be planted, and it would look wonderful. And I ask every one of you, tomorrow, to drive by Texas Avenue and look to the right and look to the left and follow it on down and continue looking to the right and to the left. And if you think that's aesthetically pleasing, excuse me. It is not. They were supposed to have planted several different varieties of wonderful trees. And there's a list in here. And I will have a set of these out there for anybody who's interested. Beautiful trees. There are none. There are a few pine trees, evergreens, or whatever they are, that are struggling to survive. We are in a city where people care about their yards and their homes, and they keep them up throughout the whole summer, and it's a wonderful city to drive around and just look at those yards. You don't want to drive around what they call the metro storm drain area because there are no aesthetics. And it's something that needs to be addressed. And do I have doubts? Well, I hope that's always going to be green and it's always going to have trees growing and it's going to be wonderfully aesthetical for people to gather in and to enjoy. I hope that's going to be true. But if there are not plans to carry through on the promises that are made, it won't happen. It won't happen. And so, we, the citizens of this community, we have rights. And one of those rights is to live in an environment that's safe, that's pleasant, that's aesthetically wonderful, and that is taken care of, and we have no health concerns



from the environment. We have that right. And we need to fight for that right if necessary. And, yes, looks good on paper, but so did the other plan, 2003. And I can assure you those trees and grasses, they're not there. I've gone out and taken pictures of the area and the riprap."

- **Comment 74.2.** "2. The Record of Decision identifies boundary changes and land set-asides that identify the area where Silver Bow Creek Restoration should occur to meet Restore Our Creek's vision. As a supporter of a restored Silver Bow Creek and participant with the Coalition's public design workshops I would request that the EPA show conclusively that the remedy, tailings removal, points of compliance and land set-aside will not preclude the ability to restore Silver Bow Creek."
- **Comment 77.2.** "The Record of Decision identifies boundary changes and land set-asides that identify the area where Silver Bow Creek Restoration should occur to meet Restore Our Creek's vision. As a supporter of a restored Silver Bow Creek I would request that the EPA demonstrate conclusively that the remedy, tailings removal, points of compliance and land set-aside will not preclude the ability to restore Silver Bow Creek."
- **Comment 79.3.** "2. Restoration of Silver-Bow Creek in its historic location behind the Civic Center."
- **Comment 81.3.** "For the past twenty years, Sister Mary Jo McDonald has been also engaged in the good fight to get Butte cleaned up. Today, I wish to join her in demanding that "the cleanup of Silver Bow Creek and its corridor from Texas Avenue to Montana Street and through the slag Canyon westward" be done so as to leave Butte's children a legacy of fresh water. AS she has expressed it, "A quality creek from Texas Ave. to Montana Street must be the number one goal!" And "No change to the water quality discharge standards should take place until all work has been completed and all tailings removed!" And that "The current remedy of cleaning and restoring the Creek from Texas Ave to Montana Street must be redone by Arco/BP so the Creek can be properly restored!"
- **Comment 82.2.** "The Record of Decision identifies boundary changes and land set-asides that identify the area where Silver Bow Creek Restoration should occur to meet Restore Our Creek's vision. As a supporter of a restored Silver Bow Creek I request that the EPA show



conclusively that the remedy, tailings removal, points of compliance and land set-aside will not preclude the ability to restore Silver Bow Creek. The current remedy of cleaning and restoring the Creek from Texas Ave to Montana Street must be redone by Arco/BP so the Creek can be properly restored!”

- **Comment 83.1.** “2. Ultimately a restored Silver Bow Creek should meander from Texas Avenue to a point where it joins with Blacktail Creek. There is likely now and certainly will be sufficient water to support a creek. The best and most cost effective time to plan for the eventuality of a creek is to contour a creek channel at the same time that the tailings are being removed and the storm water basins constructed.”
- **Comment 84.2.** “We should not settle for anything less than a full restoration of Silver Bow Creek. It is not an insurmountable task and very achievable. So why there is such resistance is mind boggling. We must have a free flowing creek from Texas Avenue to Montana Street.”
- **Comment 85.2.** “The Record of Decision identifies boundary changes and land set-asides that identify the area where Silver Bow Creek Restoration should occur to meet Restore Our Creek’s vision. As a supporter of a restored Silver Bow Creek and participant with the Coalition’s public design workshops I would request that the EPA show conclusively that the remedy, tailings removal, points of compliance and land set-aside will not preclude the ability to restore Silver Bow Creek. I also feel that once the tailings are removed, the elevation of the restored Silver Bow Creek should remain low to help serve as a collection and drainage for the area.”
- **Comment 86.2.** “The Record of Decision identifies boundary changes and land set-asides that identify the area where Silver Bow Creek Restoration should occur to meet Restore Our Creek’s vision. As a supporter of a restored Silver Bow Creek and participant with the Coalition’s public design workshops I would request that the EPA show conclusively that the remedy, tailings removal, points of compliance and land set-aside will not preclude the ability to restore Silver Bow Creek.”
- **Comment 88.2.** “Silver Bow Creek should be restored to a free-flowing stream with public access to provide much needed open space



in Butte. The remediation should be comparable to the level of restoration already completed on the downstream stretch to Warm Springs Ponds. Please restore our creek!”

- **Comment 89.2.** “I want action taken to remove toxic waste in the groundwater floodplain. We support restoration of the historic creek into a free flowing stream with amenities to enhance the community’s quality of life.”
- **Comment 90.3.** “Again I support the restoration of the crick into a free-flowing stream with improvements that enhance the economic and quality of life in our own community---- Butte America, USA!!”
- **Comment 91.3.** “1. No detail has been provided on what will happen to the section of Silver Bow Creek between Texas Avenue and Casey Street. 2. There is limited detail in the Plan regarding removal of the Blacktail Berm and its end land use. Despite promises made and Community support, the Plan provides limited discussion on how it will support the Community's vision of a restored Creek. "Will not preclude" is not the same as "support".

“4. There has been no response on why the existing creek channel above the french drain cannot serve as the creek the Community has been adamantly requesting. Certainly a compromise could be found.”

- **Comment 92.1.** “To whom it may concern: My desire in this email is to share that I would like the first mile of Silver Bow Creek restored. It’s awesome to hear that the tailings along the route are being removed and that a park and greenway amenities are being constructed along the route. To me restoring the creek would just be part of that process. My prayer is that my voice and the others speaking to this issue would be heard and all diligence would be given to make this project happen to its fullest. Thank you for your time.”
- **Comment 93.1.** “I support the last mile of cleanup for Silverbow creek that should occur and be watered from Texas Ave. bridge to Montana St. This clean up should equal or be better than the lower cleanup as it runs through our City and should include amenities as per concept drawings in the Butte Silverbow courthouse rotunda. All contaminated tailings and waste shall be removed as to not cause problems in our city in the future. Recreational opportunities such as trails, fishing, exercise equipment and an amphitheater should be included. Grasses, trees and bushes should be placed as necessary to



create a pleasing atmosphere. Butte deserves this and no less being of the mine waste cleanup and Silverbow creek as being the headwaters of the Columbia River. As a child, I spent many days at the creek and also the Columbia Gardens. My memories are many and I believe a good resolution is necessary. Thank you.”

- **Comment 94.1.** “I am writing in support of the Restore Our Creek Coalition. I support cleanup of the Silver Bow creek from Texas Avenue to the area near the Chamber of Commerce in Butte Montana. I hope to see that the tailings will be removed along the creek. Also construction of a park and Greenway along the creek will greatly enhance environment within Butte Montana. It will provide opportunities for exercise and recreation, a positive health benefit for the community. Also restoring the streamflow volume will benefit wildlife habitat.”
- **Comment 95.1.** “I am supporting the removal of the contaminated mine/smelter tailings & a restored creek in Butte's historic Silver Bow Creek corridor from Texas Avenue to Montana Street. The cleanup should be equivalent to areas already restored downstream. I want action taken to remove the toxic waste which is leaching into the ground water in the flood -plain. I want our loved ones and children protected from the harmful tailings in this corridor. I support the restoration of our historic creek into a free flowing stream with amenities to improve the community's quality of life and economic vitality. There is too many people dying from cancer from Butte. The children that grew up here are now in their early 60's and MANY have cancer and are dying. Cleanup of the tailings and restoration of the creek must be comparable to the level of remediation/restoration work already completed in the creek's 26-mile stretch down-stream to Warm Springs Ponds.”
- **Comment 99.1.** “I support the removal of contaminated mine/smelter tailings and a restored creek in Butte's historic Silver Bow Creek corridor from texas Avenue to Montana St. The cleanup should be equivalent to areas already restored downstream.”
- **Comment 100.1.** “Thank you for the opportunity for the Restore Our Creek Coalition (ROCC) to provide comments on the proposed amendment to the 2006/2011 Record of Decision and amendment plan for the Butte Priority Soils Operable Unit. The mission of ROCC is to remove the tailings, restore the creek, and create a greenway for



public enjoyment within the Silver Bow Creek Corridor from Texas Avenue to Montana Street. ROCC envisions in its published plan for a Silver Bow Creek Headwaters Park that the upper Silver Bow Creek corridor would be used for a meandering creek and urban riparian environment. The proposed amendment focuses on addressing contaminated storm water concerns by committing most of the acreage in the corridor to storm water retention ponds. However, in response to ROCC's concerns about the future of the Silver Bow Creek Headwaters Park plan, the EPA repeatedly assured ROCC in public meetings that the proposed remedy will not "preclude the restoration of Silver Bow Creek.

"5. Proposed Boundary Changes and Land Set-asides (reserved areas). Publicly shared maps accompanying the proposed amendments identify the area where Silver Bow Creek Restoration should occur to meet ROCC's vision. ROCC requests assurances in the ROD that making this zone a Technical Impracticability Zone - will not preclude the ability to restore Silver Bow Creek. ROCC supports the identified reserved areas for future creek restoration in the Northside Tailings and Diggings East between Casey Street and Kaw Avenue as delineated in the maps accompanying the proposed amendments. Further, shared maps accompanying the amendments (specifically the maps showing end land use from Texas Avenue to Harrison Avenue) need to be amended so as to show a continuous, identified land corridor from Texas Avenue to Harrison Avenue that is dedicated to future use as a corridor in which to locate a Silver Bow Creek restoration."

- **Comment 101.2.** "The Record of Decision identifies boundary changes and land set-asides that identify the area where Silver Bow Creek Restoration should occur to meet Restore Our Creek's vision. As a supporter of a restored Silver Bow Creek, I would request that the EPA demonstrate conclusively that the remedy, tailings removal, points of compliance and land set-aside not preclude the ability to restore Silver Bow Creek."

#### **2.27.2.2 EPA Response**

The lead agency for remedy is the EPA, and the lead agency for natural resource damage restoration (such as the Parrot Tailings Waste Removal Project) is the Natural Resource Damage Program, on behalf of the governor. EPA has been working with the Natural Resource Damage



Program, Montana DEQ, Butte Silver Bow, Atlantic Richfield, and community members and groups such as CTEC and Restore Our Creek Coalition to provide support in achieving the implementation of remedy, restoration, and end land use activities that are consistent with the vision for the Silver Bow Creek corridor above its confluence with Blacktail Creek.

The community has repeatedly voiced its concern that it wanted a replacement creek because the existing channel, Silver Bow Creek above the confluence, is now used for transporting contaminated stormwater to the new basins. However, clean water and contaminated stormwater cannot use the same channel without contaminating both waters. A lined creek may be constructed in this area at a later date, and that would require a liner according to EPA and Atlantic Richfield to limit infiltration to the groundwater to protect the contaminated groundwater remedy.

EPA's remediation authority under the CERCLA law is structured to address the release or threatened release of hazardous substances, pollutants, or contaminants. Requiring the construction of a meandering creek in an area where that does not currently exist is outside of that authority. EPA is addressing the release or threatened release of hazardous substances in this area by requiring the removal of mine wastes in the Northside Tailings and Diggings East waste areas and the construction of stormwater control retention/detention basins in those areas. These remedial activities are necessary to protect Blacktail and Silver Bow Creeks below their confluence from hazardous substance releases that would be harmful to fish and other aquatic life in those surface water bodies.

While EPA has determined that it does not have the CERCLA authority to require the corridor area to include a constructed creek in this area, it has taken several important actions that will ultimately lead to an area above the confluence available for such:

- EPA has worked with the community to obtain voluntary commitments from Atlantic Richfield for end land use development in this area that will include park-like features for use by the community, consistent with the community vision documents for this area. This end land use plan was released in May of 2019 to the public, and a revised version of that plan is included as part of the consent decree attachments. The end land use plan and the necessary remedial components that will be constructed in the corridor will include areas



that could support a lined, meandering creek should construction funding and water for flow become available. (The creek would be lined to prevent the surface water in the creek from infiltrating and impacting Atlantic Richfield's groundwater remedy by altering the local groundwater hydrology and/or mobilizing arsenic and metals from the underlying contaminated soils and further impacting the groundwater.)

- EPA awarded Technical Assistance Grant monies to the Silver Bow Creek/Butte Area recipient, CTEC, to review how such a lined, meandering creek could be constructed in conjunction with the proposed remedy. As the community continues to address the end land use of the corridor area, including the possible location of a lined creek, the many ideas given in these comments about the exact nature of the feature can be further discussed and decided upon.
- The State of Montana has agreed to set aside funds received from the BPSOU consent decree settlement that could earn interest over time and contribute as a match fund to the development of a lined creek in this area if land, water, access, infrastructure, and other issues are resolved.

The *Further Remedial Elements Scope of Work* (EPA 2018b), which is an attachment to the proposed consent decree, provides details about the planned remediation in these areas that will be required under the expanded BPSOU remedy, which is the result of the 2020 BPSOU Record of Decision Amendment. The expanded remedy will require the settling defendants to monitor, improve, and maintain the BPSOU subdrain groundwater capture facility that EPA believes has worked well to date to significantly reduce arsenic and heavy metal contamination in surface water during chronic stream conditions. The expanded remedy will also require the settling defendants to collect additional contaminated groundwater impacting the creeks and/or sediments. It will also maintain a robust groundwater monitoring system between Texas Avenue and Blacktail and Silver Bow Creeks, which is included in the sitewide groundwater monitoring plan. The expanded remedy also requires a diversion structure that will be installed in the upper reaches of Silver Bow Creek above its confluence with Blacktail Creek to divert contaminated stormwater from the channel to the Diggings East stormwater basin. The expanded remedy also requires the removal of mine waste materials in the vicinity of Diggings East and Northside Tailings waste areas to facilitate the installation of the stormwater



retention/detention basins. Atlantic Richfield has committed in its end land use plans, also released in May 2019, to voluntarily install park-like features and extensive vegetation in these areas. The expanded remedy also requires the removal of the contaminated floodplain materials in Blacktail Creek within the BPSOU surface boundary, including the Blacktail berm and the wetlands in this area and the installation of a contaminated groundwater control feature(s) in this area. During the remedial design process, remedial design draft plans will be available to the public as they are developed.

As for the status of Silver Bow Creek above its confluence with Blacktail Creek in terms of state environmental regulation, see the response in Section 2.26, Silver Bow Creek Legal Issues.

## **2.28 Stormwater Issues**

### **2.28.1 Monitoring**

#### **2.28.1.1 Comment Summary**

Four comments were received dealing with monitoring of stormwater discharge. There were suggestions of caged fish studies and requests for additional monitoring locations.

- **Comment 8.8.** “Finally, I don’t see in either the ROD or the proposed plan to modify it, any reality checks for the predictive modeling done for Silver Bow Creek’s viability throughout the drainage. Recent surveys of both aquatic organisms and fish populations downstream from Butte show disappointing rates of recovery of the entire waterway. I’d like to see the plan specifically incorporate FWP and DNRC oversight of the recovery process, including FWP’s “canary in the mine” technique of using caged fish studies (and comparable techniques for benthic invertebrates) during high flow events at various reaches of the stream to test the effects of potential exceedances on actual residents of the creek. Modeling is fine as a beginning, but the plan should engage the same state agencies that monitor the health of other waterways in the state to ensure that everyone’s on the same page about the status of stream recovery.”
- **Comment 22.2.** “1.1 CTEC believes that stormwater surges, passing through the Butte municipal sewage treatment plant and carrying elevated levels of COCs is a largely unrecognized CERCLA issue that should require a specific monitoring program and specific BMPs to address the problems as they become understood. In 2008, a Montana Fish Wildlife and Parks cage fish study correlated a storm event



passing through butte's treatment plant, copper levels exceeding the acute standard by an order of magnitude, and 100% mortality in caged westslope cutthroat (See Attachment A). The current surface water monitoring program is incapable of detecting potentially fish killing events. While the current monitoring program has demonstrated that the upgraded plant has substantially reduced metals discharge to Silver Bow Creek during normal flow conditions, what happens to metals levels during storm events is unknown. CTEC has two recommendations. The Surface Water Monitoring Plan, as attached to the Consent Decree or Order, should include monitoring the outfall of the sewage treatment plant. Monitoring should consist of sequential ISCO sampling that would be calculated to account for residence time in the plant. Additionally, the ISCO sampler at SS-07 should be moved downstream approximately ½ mile to ensure better mixing of Silver Bow Creek and treatment plant effluent. A Hydrolab survey at the current location demonstrates a clear lack of mixing (See Figure 1)."

- **Comment 25.5.** "In addition, Trout Unlimited supports additional monitoring of contaminants at the Butte municipal sewage treatment plant outfall during storm events to determine if additional action is required to protect Silver Bow Creek from this stormwater pathway."
- **Comment 29.4.** "With respect to monitoring, CFC supports the comments submitted by CTEC that request expanded and/or relocated surface water monitoring stations in order to better understand surges in heavy metal levels during storm events. Ideally, as the understanding of standard Clark Fork Coalition exceedances during storm events is better understood, we can better understand and prevent negative impacts to aquatic life in Silver Bow Creek."

#### **2.28.1.2 EPA Response**

EPA appreciates these comments and will consider all of the suggestions as more detailed surface water monitoring plans are developed during the remedial design process. The remedial actions addressing stormwater under the expanded remedy will significantly change the way stormwater affects Silver Bow Creek and Blacktail Creek within BPSOU. The settling defendants will be required to collect performance samples to monitor the performance of the remedy components at the western edge of the BPSOU where Silver Bow Creek leaves the operable unit. The locations where the performance samples will be collected will be determined during the



remedial design, but it is anticipated the locations initially will include the Metro treatment plant. Regarding the location of SS-07, see the response to Comment 22.13 at Section 2.33 Technical Text and Figure Changes for the 2020 Record of Decision Amendment.

## **2.28.2 Other**

### **2.28.2.1 Comment Summary with EPA Responses**

Seven comments were received that raised issues with the need for contingent measures to verify the protection of BPSOU surface water from stormwater events if the expanded remedy addressed in the 2020 BPSOU Record of Decision Amendment does not result in the protection of the aquatic environment. Specific comments disagreed with EPA's proposal to eliminate a constructed stormwater treatment plant as a contingency should water quality performance standards identified in the amendment not be met. Many other comments in this category address the appropriateness of the proposed remedial action addressing contaminated stormwater, EPA's authority to require these measures, and the complication resulting from other sources of contaminants of concern other than historic mine waste in an urban environment. Unlike the rest of the document, where it is possible to answer several comments with one response, these more specific comments are answered individually in a series of comments and responses that follow.

- **Comment 22.2.** "1.3 The amended ROD should be clear that contingency measures will be required if the stormwater controls identified in the Proposed Plan do not meet standards, including the proposed waived to standards. The Proposed Plan removes active stormwater treatment as a contingency measure from the ROD, leaving Silver Bow Creek without a guarantee that it will be safe for aquatic life. EPA's November 2018 Draft Surface Water Technical Impracticability Evaluation Butte Priority Soils Operable Unit Silver Bow Creek Butte Area NPL Site Butte (TI Waiver) does not address that it is technically impracticable to treat stormwater using active treatment and we do not believe it is impracticable. It is EPA's charge to protect the environment and we currently have no information providing a reasonable guarantee that the proposed stormwater basins will protect the creek. The amended ROD should be clear that when complete the remedy will meet federal water quality standards. After the compliance standard determination period is complete, protectiveness of the final water quality standards should be demonstrated with caged fish studies."



**EPA Response.** The expanded remedy selected in the 2020 BPSOU Record of Decision Amendment is EPA's and Montana DEQ's best effort at selecting and requiring a protective remedy for BPSOU that will meet performance standards identified in the BPSOU ROD. EPA will require extensive monitoring of BPSOU surface water to measure whether the remedy is protected and meets performance standards. EPA enforcement mechanisms, including consent decree provisions, allow EPA to require certain specified additional work to verify protectiveness and performance standard compliance if that is necessary.

As the proposed plan explains, an active stormwater treatment plant contingency, contained in the 2006/2011 BPSOU Record of Decision, is not practicable in Butte. The conclusions of the TI analysis indicate that total recoverable copper and zinc are unlikely to meet acute water quality performance standards (i.e., Circular DEQ-7 standards) during most wet weather flow conditions, regardless of the measures implemented to control the contaminants of concern (including treating storm water at a conventional water treatment plant). As stated in the 2020 Record of Decision Amendment, EPA believes that capture and conventional treatment of storm water would be impracticable owing to severe space limitations within the BPSOU and would not necessarily be more reliable or effective than the storm water basins and other components of the storm water BMP program. The basins will treat storm water by settling of suspended solids, making this contingency unnecessary.

- **Comment 98.3.** "Surface Water Remedy/Storm Water BMPs The Proposed Plan identifies several modifications that would expand the existing surface water remedy at the BPSOU, which AR expects will further improve surface water quality and reduce the magnitude and frequency of exceedances of standards during storm (wet weather) events. A primary element of the modified surface water remedy would be a Fourth and final round of stormwater best management practices (BMPs), involving design and construction of final storm water controls at Buffalo Gulch and Grove Gulch, and new storm water basins (including significant excavations) at Northside Tailings and Diggings East.

"EPA acknowledges this will "be the final round of iterative BMPs called for in the 2006 ROD." Proposed Plan at 9. AR agrees. These final BMPs will effectively capture and settle heavy metals in melting



snow and storm water, which come from many sources, including historic mine waste sources; exposed rock outcroppings and soils that contain high levels of naturally occurring minerals; and urban sources of metals found in construction materials, consumer products and municipal waste, all of which presently flow into SBC in stormwater. All practicable BMP technologies, including the first three BMP cycles in place, now have been assessed, and AR believes the Fourth and final cycle of BMPs will provide a comprehensive and technically feasible way to safely manage storm water with elevated levels of metals from a combination of natural sources, mining, and urban activity as part of a holistic approach to management of stormwater.

“Although the BMPs and associated excavation work are expected to support further surface water quality improvements, the Butte community will continue to grow, and future urban development may have increased impacts on water quality in Silver Bow and Blacktail Creeks. These impacts in streams within the watershed are not unique to Butte. And there are many sources that may increase metals loading to surface waters in the BPSOU, including the past use of chat and other mineral processing waste by the Montana Department of Transportation to construct Interstate 90; similar past uses of mining and mineral processing waste to construct municipal streets, buildings and infrastructure in BPSOU; metal sources located upstream of the BPSOU boundary that flow into Blacktail and Silver Bow Creeks; active mining operations that impact areas releasing snow melt and storm water run-off to Silver Bow Creek; and use of commercial products containing copper, zinc, and other contaminants of concern, such as brake linings, metal roofing, and other products like copper piping and wires, in areas that release snow melt, storm water run-off, and/or groundwater to Silver Bow Creek. The Proposed Plan does not fully recognize the existence and uncontrolled nature of these metal sources in and around the BPSOU, or their on-going contribution of metal contaminants to surface water that flows through BPSOU. Yet these ubiquitous sources of metals impact surface water quality and the technical feasibility of achieving applicable surface water quality standards. The Amended ROD should acknowledge and describe the impacts of these other metal sources at the BPSOU; explain how the remedy seeks to capture and remove metals from multiple sources in storm water settling basins; and explain how legal and technical limits on EPA’s ability to use CERCLA to control all metal sources may



affect the ability to achieve compliance with in-stream surface water standards.

“As it has in the past, AR maintains that EPA and DEQ cannot lawfully require AR to capture all sources of metals that enter storm water and surface water in the BPSOU, to achieve numeric surface water quality standards in Silver Bow Creek. Some of these sources are exempt from remediation under CERCLA, including naturally occurring minerals (42 USC § 9604(3)(A)) and metal roofs, pipes, and other things that are part of a residential, commercial or community building or structure (42 USC § 9604(3)(B)). Some of these sources are not attributable to AR or its predecessors, including metals in consumer products used by third parties that have no relationship to AR (42 USC § 9607(b)(3)), and metals in non-point sources of storm water. Nonetheless, AR supports comparison of surface water in Silver Bow Creek with surface water quality standards as an appropriate metric for assessing the effectiveness of the surface water remedy and achievement of remedial action objectives (RAOs). AR anticipates that management of stormwater in the manner identified in the Proposed Plan will further improve water quality above and beyond the improvements that have been achieved through past remedial actions implemented since the 1990s, and beyond those which can be required under CERCLA. Accordingly, notwithstanding the limits of EPA’s authority under CERCLA to require AR to control and remediate all sources of metals in the urban environment as part of the BPSOU remedy, AR supports the storm water BMPs and modified surface water compliance assessment methodology in the Proposed Plan as part of a comprehensive approach to reducing all sources of metals in Silver Bow Creek, so long as AR, EPA, the State, BSB, and potentially other parties reach a final CD to implement the Proposed Plan on terms that are acceptable to all parties.”

**EPA Response.** In Section 2.2 of the TI evaluation report (EPA 2018a), EPA provided a description of the “source of contaminants” within the BPSOU. These included non-mining waste sources from urban areas like Butte. However, the majority of contaminants of concern releases within the BPSOU to surface water and groundwater are due to the extensive historical mine waste sources from Butte’s rich mining past.

The 2020 Record of Decision Amendment will include remedial elements that will be implemented to improve water quality in the



receiving stream(s) that are fully within EPA's CERCLA authority. If non-mining sources can be clearly identified and bifurcated from mining sources, then control of those sources is not required. However, where mining sources contribute to degradation of surface water quality, the settling defendants are obligated to address those sources even if combined with non-historical mining-related sources.

Finally, EPA and Montana DEQ will work with the responsible parties, including Atlantic Richfield, to account for upstream or non-historical mine waste sources during monitoring and future evaluations in order to address the issues raised by Atlantic Richfield in this comment. See Attachment A to the statement of work, which is Appendix D of the consent decree.

- **Comment 98.8.** "B. Additional Comments on the Expanded Surface Water Remedy. The surface water remedy components of the Proposed Plan include: significant excavation of mine wastes in upper SBC, Blacktail Creek, and the BRW area; rerouting a portion of SBC away from the Slag Canyon through the BRW area; design and construction of largescale BMPs for storm water control; and additional groundwater control and capture. See Proposed Plan at 9 & 11, tbl. 2. AR will commit to complete these surface water remedial actions as part of a final CD negotiated and agreed to by all parties, and on that basis generally supports these elements of the Proposed Plan. That said, it is AR's position that EPA does not have authority under CERCLA to unilaterally order AR to perform some of these proposed actions because: (1) they have been selected to achieve RAOs based on ARARs that should not apply to the surface water remedy (i.e., in-stream compliance with Montana DEQ-7 numeric surface water standards); (2) are not necessary to achieve the RAOs identified for the remedy; and/or (3) otherwise could not be required by EPA and/or DEQ pursuant to applicable law. Examples of such actions include EPA's additional proposed control of groundwater discharges to surface water and the proposed large-scale Fourth and final round of BMPs, both of which are discussed in this comment."

**EPA Response.** As noted above, the remedial elements required in the record of decision amendment are necessary to protect human health and the environment within and downstream from the BPSOU and/or to meet performance standards identified in the amendment. These actions are fully within EPA's CERCLA authority. Atlantic Richfield does not give a reason why ARARs described in the 2020



BPSOU Record of Decision Amendment “should not apply to the surface water remedy,” but section 121(d) of CERCLA, 42 U.S.C. § 9621(d) requires CERCLA remedies to achieve compliance with selected ARARs, including state and federal surface water standards. In short, the remedy selected in the 2020 BPSOU Record of Decision Amendment is fully enforceable. EPA looks forward to working with the responsible parties, including Atlantic Richfield, in a responsible and efficient manner to implement the selected remedy through a CERCLA consent decree.

- **Comment 98.9.** “Surface Water Remedy RAOs. Under CERCLA and the NCP, EPA has authority to identify and require remedial action to the extent necessary to meet RAOs for surface water, including actions to control discharges of ground water to surface water to meet surface water objectives. See, e.g., 40 C.F.R. § 300.430(e)(2)(i), (e)(9)(iii); Preamble to the National Oil and Hazardous Substances Pollution Contingency Plan, 53 FR 51394, 51426-27 (Dec. 21, 1988); EPA, Guidance for Conducting RI/FS Under CERCLA, §§ 4.2, 4.3.1.1 (Oct. 1988). The 2006 ROD established compliance with in-stream surface water quality standards as a RAO for the surface water remedy, which the Proposed Plan leaves unchanged (except for the limited up-front waivers). See Proposed Plan at 5. As noted above, AR does not agree that the in-stream surface water quality standards are an applicable, relevant and appropriate standard for a storm and surface water remedy for historic mining waste in the city of Butte, because there are many other sources of metals that affect stormwater quality at the BPSOU, including other point sources and non-point sources all across Butte Hill and the rest of BPSOU, and in an urban watershed in a city of approximately 35,000 people it is impossible to use a remedy for historic mining waste to prevent all of the diverse sources of metals from entering stormwater that flows into surface water streams in BPSOU. For these reasons, compliance with such in-stream standards should not be a RAO for the surface water remedy.”

**EPA Response.** See the responses to comments 98.3 and 98.8 above.

- **Comment 98.11.** “Regulation of Storm Water Discharges at BPSOU. The Proposed Plan describes use of large-scale BMPs to capture storm water from drainages off Butte Hill and to the south of SBC (e.g. Grove Gulch and Uncaptured Surface Flow Areas) that otherwise would reach SBC and impact surface water quality. Design and construction of the BMPs at Diggings East and Northside Tailings



require significant removals of mine waste to accommodate these new basins. The scope of the proposed BMPs that are part of the Fourth and final cycle of the Proposed Plan's strategy for stormwater management at the BPSOU is unprecedented and goes beyond what EPA could unilaterally require AR to perform under its CERCLA remedial authority."

**EPA Response.** Environmental impacts from contaminated stormwater to Blacktail Creek and Silver Bow Creek below its confluence with Blacktail Creek are significant, and the data clearly show that in-stream ARARs during storm events and at times during baseflow within the creeks of BPSOU are not in compliance with performance standards as a result. As noted above, the actions required in the amended Record of Decision are in response to these conditions and clearly within EPA's CERCLA authority.

- **Comment 98.11a.** "An important element of the surface water/storm water remedy, and a predicate for investment of the resources required to design and construct the Fourth and final cycle of BMPs, is the surface water TI waiver identified in the Proposed Plan. See Proposed Plan at 6-8. As noted in its opening comments, AR agrees the immediate waiver of certain in-stream performance standards and adoption of replacement standards is appropriate and supported by CERCLA, EPA guidance, and the TI evaluation, and therefore fully supports adoption of these changes in the Proposed Plan. Although AR does not agree with all of EPA's conclusions drawn from modeling completed to support the TI waiver, AR fully supports the Proposed Plan process for adoption of replacement standards (based upon post-construction monitoring) as consistent with CERCLA and EPA guidance.

"On the other hand, AR does not agree with EPA's suggestion that a TI waiver is only warranted when a technology is shown to be "impossible to carry out." Proposed Plan at 6. Neither the NCP nor any of EPA's guidance on evaluating "technical impracticability" supports this "impossible to carry out" standard. To the contrary, EPA Guidance makes clear that TI determinations should be based on engineering feasibility, reliability and, where appropriate, cost considerations. See U.S. EPA, Guidance on Evaluating the Technical Impracticability of Ground-Water Restoration, at 9-1 (Sept. 1993); see also NCP Preamble, 55 FR 8748 (Mar. 8, 1990). Use of this language, particularly in quotation marks, is misleading. AR requests that EPA



revise this language and any other discussion of the TI standards to use language from EPA Guidance—e.g., “technically practicable from an engineering perspective,” with reliability and cost considerations taken into account.”

**EPA Response.** EPA used the quoted language in the proposed plan to help explain in laymen’s terms what a TI waiver under the CERCLA law was based on. EPA agrees that under CERCLA law, regulations, and EPA guidance, a TI waiver is based on engineering feasibility, reliability, and where appropriate and to a lesser extent, cost considerations. EPA further agrees that the correct and complete term for a TI waiver is technically practicable from an engineering perspective. EPA acknowledges Atlantic Richfield’s support of the up-front and contingent in-stream surface water ARARs provided for in the 2020 BPSOU Record of Decision Amendment.

- **Comment 98.11b.** “Another proposed change to the storm water remedy is elimination of the contingency in the 2006 ROD to install a conventional treatment plant for chemical treatment of storm water in Butte in the event surface water standards could not be met. See Proposed Plan at 9, 11; see also 2006 ROD at 12-9. The 2006 ROD requirement for conventional treatment of storm water also is unprecedented, and neither EPA nor the State has authority to require AR to implement this type of city-wide treatment of storm water under the federal Clean Water Act or the state counterpart. Moreover, as EPA states in the Proposed Plan, storm water capture and treatment is impractical and would not be more reliable or effective than the proposed Fourth round of BMPs, and therefore this contingency is both unreasonable and unnecessary. See Proposed Plan at 11. For all these reasons, AR supports both the proposed storm water BMPs (as agreed upon and incorporated into a final CD) and the elimination of conventional treatment of stormwater as a contingent remedy element.”

**EPA Response.** See response to comment 22.2, above.

- **Comment 98.11c.** “The federal Clean Water Act does not support enforcement and/or regulation of storm water non-point source discharges and BMPs in the same manner as point source discharges. See, e.g., *Ecological Rights Found. v. Pac. Gas & Elec. Co.*, 713 F.3d 502, 508 (9th Cir. 2013). Under the federal Clean Water Act, EPA generally defers regulation of nonpoint source pollution to states, and



DEQ oversees the Clean Water Act program for management of stormwater discharges to surface water in Montana. The scale and scope of the storm water BMPs described in the Proposed Plan are unprecedented in the State of Montana. AR has not found any other urban area in Montana where DEQ has required storm water BMP basins similar to those described as part of the Proposed Plan. The State does not consistently apply its stormwater program requirements to manage urban stormwater runoff to protect a receiving stream in the manner described in the Proposed Plan. The approach to storm water management in this Proposed Plan is unique to the City of Butte. Although AR believes the proposed storm water basins go above and beyond the scope of remediation that AR can be required to implement to meet state water quality goals, these BMP basins will further mitigate the impact of the many disparate sources of urban stormwater within the City of Butte on state waters, and AR supports these elements of the proposed remedy if they are implemented under a final CD that is negotiated and agreed to by all of the CD parties.

“How the BMP basins are operated will determine the effectiveness of treatment. Under whatever mode of operating parameters that are ultimately adopted, if surface water standards are not met when the Fourth cycle BMPs are in place, during wet weather events or normal flow events, the replacement standards identified in the Proposed Plan will become the performance standards. AR supports this process for further adjustment of in-stream performance standards as part of a final CD to design, construct and operate the proposed storm water BMPs on terms that are negotiated and agreed to by all of the CD parties.”

**EPA Response.** EPA and Montana DEQ disagree that the requirements of the 2020 BPSOU Record of Decision Amendment for control of contaminated stormwater is either unprecedented or outside of CERCLA or Comprehensive Environmental Cleanup and Responsibility Act authority. Data clearly show that noncompliance with in-stream surface water standards within BPSOU is ongoing, and CERCLA requires remedial actions to meet ARARs, including in-stream ARARs selected in the amendment.

EPA agrees with Atlantic Richfield that who operates retention/detention basins after they are constructed will determine the effectiveness of the remedy. That is why EPA believes all parties



should examine and analyze such issues carefully as remedial design is implemented.

The *Surface Water Technical Impracticability Evaluation Report* (EPA 2018b) included and evaluated a list of technical elements that EPA, Montana DEQ, and the responsible parties thought were technically practicable. Owing to the conclusions of the report, a narrow TI waiver for surface water under specific flow regimes and only for specific contaminants of concern is adopted. The up-front TI waiver will apply to the State of Montana DEQ-7 acute aquatic life standard for total recoverable copper and zinc only and only under wet weather conditions.

- **Comment 98.23.** “I. Page 7, Column 1, First Full Bullet. The Proposed Plan states that “[p]otential post-construction waivers” of other Montana DEQ standards (acute performance standards for cadmium, lead, and silver; chronic performance standards for copper and lead; and dissolved acute performance standard for copper and zinc) could be waived and replaced, as necessary, based on post-remediation monitoring and compliance assessment demonstrating the standards are not being met. See also Proposed Plan at Page 7, Column 2; Page 8, Exhibit 4; Page 8, Columns 1 & 2; Page 10, tbl. 1. AR agrees that additional waivers and adoption of corresponding replacement standards, as identified in Table 1 of the Proposed Plan, may be necessary after remedial construction is complete. As discussed above, AR supports agreement upon a surface water compliance assessment methodology to support the adoption of Replacement Standards under the Amended ROD, as part of a final CD to implement the Proposed Plan on terms that are acceptable to all of the CD parties, and that also recognize that surface water is impacted by metal sources that are not related to historic mining and that are beyond the scope of the CERCLA remedy.”

**EPA Response.** EPA acknowledges Atlantic Richfield’s comments and will work with all responsible parties on efforts to monitor and assess in-stream performance standard exceedances if they occur post-remedy construction. EPA also acknowledges Atlantic Richfield’s support for the contingent in-stream surface water waivers described in the 2020 BPSOU Record of Decision Amendment.



## 2.29 Stormwater Retention/Detention Basins

### 2.29.1 Supports Proposed Plan

#### 2.29.1.1 Comment Summary

Eight commenters expressed support for the use of retention/detention basins as a tool in controlling stormwater at the BPSOU.

- **Comment 5.2.** “The series of retention/detention ponds is a particularly good part of the plan--dealing with stormwater and runoff from contamination on the hill is a major concern for Butte. Not only does the plan address these problems using the best science, but it will afford the community with a huge public park area right in the middle of town with many public amenities and recreational opportunities. This is the legacy that one would hope Butte would treasure after the long Superfund process on this area.”
- **Comment 15.3.** “I believe the additional add-ons of several storm water management basins will significantly change the storm water hydrograph in Silver Bow Creek, and will have good success in removing more storm water sediments, and will ultimately complete a fairly exhaustive list of remedies completed on the Butte Hill.”
- **Comment 25.4.** “Storm Water Controls. TU [Trout Unlimited] supports implementation of robust stormwater controls to protect surface water quality in Silver Bow Creek during storm events. Stormwater BMPs for metals support the design and implementation of retention ponds (versus detention structures) to optimize metals removal from stormwater runoff in Butte and be most protective of fish populations downstream.”
- **Comment 29.2.** “Stormwater Retention Ponds/Monitoring. In general, the CFC remains an advocate of the stricter state water quality standards based on total recoverable concentrations in lieu of federal water quality standards. Nonetheless, where, as here, a TI waiver is deemed appropriate for storm water events, CFC supports the use of stormwater controls, such as retention ponds, to capture and minimize runoff contamination. The use of retention ponds has proven effective in removing/minimizing contaminant levels in adjacent drainages (such as Missoula Gulch), and, as proposed, these efforts should be expanded for the remainder of Upper Silver Bow Creek.”
- **Comment 40.2.** “I think that, for example, one thing it does that we've talk about for a long time in this community is provide some kind of



systematic addressing of the storm water runoff issue. It's not perfect. But considering where EPA was 10 years ago, where EPA didn't countenance settling ponds or retention ponds and wanted to rely on other measures that are just not effective, public education, and so forth, I think that that has come a long way.”

- **Comment 55.3.** “So, for the longest time, when I worked for DEQ, storm water was my biggest issue. I was -- it is far exceeding standards and it was the biggest problem for Silver Bow Creek. One thing we did learn about storm water is that the storm water ponds on Missoula Gulch were very effective. As a matter of fact, those ponds will remove up to 95 percent of the total recoverable copper just by holding the water back for a while. It gets released once it's pushed out by maybe the next series of storms. That's a very effective system. And it's passive treatment. It's kind of got some elegance to it really.”
- **Comment 63.2.** “And, just looking at this, kind of taking back on Joe's comments earlier, it seems to me like the preferred and the strategic sort of push in this map that's up on the screen right now is to remove tailings and replace them, which, you know, gets at the groundwater issue, and replace them with catch basins, we have retention, detention, settling, whatever you want to call them, on the surface. And that makes sense to me from a logical point of view because you're getting a two-fer. One, you're limiting a source of groundwater contamination as flow into the creek; and, two, you have available real estate up on top where those tailings used to be that allow you to develop, you know, catch basins.”
- **Comment 65.6.** “I'd like to thank the Clark Fork Coalition, Restore Our Creek, others. I feel like you guys have been heard. I see a lot of concessions on the screen. And I really believe that without your guys' persistence and pushing we wouldn't see a design that we see today. I think we would see a lot more square storm water ponds, like what they're legally required to put in. I believe that the plan is a concession of what the Clark Fork Coalition and ROCC have requested while obtaining the remedial design objectives and obtaining the most effective design to prevent storm water trigger pollutants from reaching the stream. And we heard that from other commentators earlier. This is the most effective remedy storm water ponds.

“The space required to create these ponds and the look-feel-touch components that we're asking for can only be obtained by substantial



excavation of the proposed order on the screen, the removal particularly of the Northside Tailings and Diggings East. I believe it should be made very clear that their removal is not legally required by the ROD, or the Record of Decision. EPA has no grounds to force this as being volunteered to us to accommodate our requests. I am grateful for that. And as there is no legal pathway for anyone to be forcing ARCO to do this, they're doing this in good faith as a concession in this negotiation with our community.”

#### **2.29.1.2 EPA Response**

Support for the retention/detention basins is noted. EPA believes that the basins will play a valuable role in creating a remedy that is protective and sustainable for the long term.

As noted above, the 2020 Record of Decision Amendment requires the implementation of large stormwater detention/retention stormwater control basins in the SBC-Above the Confluence area. Two areas with mine wastes—the Diggings East and the Northside Tailings—will be excavated from the ground surface to the high water table elevation within the most recent three year period and the stormwater basins will be installed in those areas. The basins will be lined to prevent infiltration to groundwater. Any tailings, waste or contaminated soils excavated will be transported to and disposed in a repository. These remedy components are necessary to address the environmental threats from mine waste-contaminated stormwater that runs off Butte Hill during storm events into Blacktail Creek and Silver Bow Creek below the confluence. These threats were identified as unacceptable environmental risks in the ecological risk assessment prepared for the BPSOU. The basins will hold significant volumes of contaminated stormwater during and after storm events, allowing heavy metals and other contaminants to settle out before the stormwater flows to Silver Bow Creek.

As noted above, end land use plans to be implemented by the settling defendants will include park-like features in the area around these basins in accordance with community plans for the use of this area. The end land use features will be fully compatible with the stormwater control basins.

### **2.29.2 Against Proposed Plan**

#### **2.29.2.1 Comment Summary**

Eight comments were received that were against the concept of adding stormwater retention basins.



- **Comment 2.6.** “#5. Giant retention ponds that I call Zika/mosquito ponds will be installed to deal with storm water run-off from the Butte Hill instead of responsibly cleaning the Hill.”
- **Comment 7.6.** “D Stormwater: The fact that blue Copper water under the Parrot Tailings is able to be piped to Montana Resources for Copper extraction makes one question ARs assertion that stormwater from Warren Avenue and the Greeley area cannot also go to that pond, to the Berkeley Pit, or other destinations where the water could end up in MR’s mining operations. Please respond about viability of diverting via pipes to MR, or to mine shaft/tunnel destinations. Stormwater that does not reach the Silver Bow Creek corridor helps preserve the \$157 million cleanup of the creek below Butte. CERCLA law requires permanent remedy, with the word, “permanent” stated five times in the first three paragraphs of its 1986 SARA edition. Butte people are concerned that ARCO is not willing to send stormwater to the Berkeley Pit, which is a PERMANENT remedy, as opposed to leaving it in the floodplain where it can be re-mobilized. A major storm (the creek has had 100-year floods) could overwhelm retention basins and “permanently” foul the cleaned up Silver Bow Creek below Butte. EPA must not allow cavalier thinking that could result in the restored creek being re-polluted in any way.

“Diversion: For the sake of Future Butte People after mining has ended, require now that stormwater from the Hill be put into pipes for destinations of the Berkeley Pit, or Montana Resources pond (as is done at the Parrot Tailings), or into mine shafts through drilled access; e.g., Anderson Shafts, Ophir shaft, or directly to the Butte-Silver Bow Lagoons. The highest concentrations of Copper reaching the creek emanate from Warren Avenue, Greeley neighborhood, and the Civic Center. Much of that water could be re-routed through pipes to destinations other than the Silver Bow Creek corridor. It is unconscionable to take the “lazy man’s way” in this cleanup by deciding to allow the toxins to mobilize into the creek when diversion could keep them within the Mine Flooding O/U for treatment in perpetuity. Diversion will decrease need for perpetual O&M on corridor ponds and also lessen harm to the costly cleanup below Butte. In addition to minimizing amounts of Copper, Zinc, Lead, Arsenic and Cadmium that now pour into the corridor, diversion will allow the citizens of Butte to actually have space for a nice Headwaters Park in



the center of town because the size of corridor stormwater basins will be smaller than in the Proposed Plan.

“Additional detention/retention basins: To keep fewer toxins from reaching Silver Bow Creek, I have asked about the Anderson Shafts west of entrance to MR where today blue Copper coats rocks and debris. If you do not choose to divert stormwater into the Anderson east camp shafts, please consider creating a stormwater retention basin there, for it would capture metals south of the Belmont, west of MR offices, and east of the EJ public housing community, Silver Bow Homes – from which comes much of the highest Copper presently going to the Silver Bow Creek corridor.

“Greeley area stormwater: CERCLA requires that the very high levels of Copper coming into BPSOU from outside that boundary be remediated as part of BPSOU. Will that be done, and how? EPA has stated it doesn’t know where that Copper is coming from. Please say what Remedial Investigation will be done to determine the cause and to stop this source of pollution from reaching the Silver Bow Creek corridor.”

- **Comment 38.2.** “Butte does not need simply storm water treatment with retention/detention ponds. Imagine Butte folks sitting on benches overlooking the ponds which are lined with a black liner. A simply stunning aesthetical scene!!! Number 4 of sufficient changes states that there will be final storm water controls in "upper" Silver Bow Creek. Final storm water controls (primarily detention ponds) to settle out contaminated suspended sediments from Buffalo Gulch and drainages reporting to Silver Bow Creek for 5-year storm event. "THIS IN RESPONSE TO PUBLIC INPUT." I HAVE ATTENDED MANY MEETINGS AND I HAVE NOT HEARD THE CITIZENS ASKING FOR RETENTION PONDS TO DEAL WITH STORM WATER. IN FACT THAT IS WHAT THE CLEANUP IN THE CORRIDOR FROM CASEY STREET TO THE BUTTE REDUCTION WORKS IS ALL ABOUT!!!! That is not what was requested by the citizens who attended many meetings throughout 3 years. The request was for a complete cleanup that leaves this community with the opportunity to thrive as a site delisted from the Super Fund List. If we are delisted simply because it is time or the cleanup focuses only on Storm Water than Justice has not been served.



“A better solution for the storm water abatement would be to develop a plan to drill into areas on the hill to allow the storm water to flow into the mine tunnels especially since the pit water is going to be drawn down about 100' by ARCO to protect the pit in the event of a major breakdown of the Yankee Doodle Tailings pond. This would allow the storm water to be channeled into the pit as the water in the mines have been doing since ARCO shut off the pumps. (1983?) British Petroleum is one of the largest businesses in the world and one that definitely knows how to drill holes certainly should be able to figure how to drill holes on the hill so that storm water could be directed into the mine tunnels. The underground mines already drain into the pit and so the additional storm water would not cause any issue. We need to have new engineers to relook at the necessary cleanup with new eyes and new technology. Obviously, ARCO had the ability to do that. If the storm water is treated differently by diverting it to the underground mines and allowed to flow into the pit than the area around the confluence could actually become a setting for a park that is truly aesthetically pleasing and enjoyable for all. Time to think out of the box!!!”

- **Comment 41.11.** “And, finally, for me, I'm adamantly opposed to what I call the "Mosquito Zika Pond." We've got to have people working in the federal government and the state government that are smarter than to give us these ponds, these great big ponds, where what we're doing is we're going to clean an area and then we're going to recontaminate it again. Wow. You know.”
- **Comment 47.3.** “We wanted to do all kinds of things with the money that was brought from the suit. NRD money, Folks, Butte. The remainder belongs here. Let's get the cleanup done right so that we're not collecting the storm water from up on the hill and then having to make sure it drops off somewhere in the retention ponds.”
- **Comment 74.6.** “7. I believe that the allocation of so much of the limited space in the Silver Bow Creek corridor to storm water retention ponds is the wrong choice for treating the waste and toxicity that is carried by storm water. The remaining storm water should be routed to the Berkeley Pit (where a lot of storm water is already gathered). When removed from the pit, that storm water, along with any other water being removed from the pit will have to be treated to gold standard. There are a number of ways this collection of storm water and diversion to the pit can be done (such as having a number



of small collection points on the hill and then drilling vertical pipe shafts from those collection ponds so that storm water will flow into the mine tunnels from where it will eventually find its way to the Berkeley Pit for ultimate treatment before being released to Silver Bow Creek). And there are other ways and it should be done.”

- **Comment 81.1.** “Storm water basis, or retention ponds in the basin are not needed. As a member of CLEJ, I agree with Sister May Jo that “Storm water should be captured and returned to the Berkeley Pit for ultimate treatment, or treated on the Hill before it gets to the Creek.”
- **Comment 82.6.** “We do not need storm water basins, aka---retention ponds in the Basin. Storm water should be captured and returned to the Berkeley Pit for ultimate treatment, or treated on the Hill before it gets to the Creek. Drill wells so that storm water will flow into the mine tunnels and be discharged to the Berkeley Pit for treatment.”

#### **2.29.2.2 EPA Response**

EPA disagrees with the comments that the stormwater retention/detention basins are not needed. Stormwater basins are a sustainable approach used throughout the country that mimic natural processes and provide for efficient treatment of stormwater contamination. During implementation of the 2006/2011 BPSOU Record of Decision, three cycles of stormwater BMPs were constructed with the purpose of controlling contaminated stormwater and its discharge into Silver Bow Creek below its confluence with Blacktail Creek. These efforts reduced contaminant concentrations in stormwater but were not sufficient to meet in-stream ARAR standards, and additional work was needed.

Retention/detention basins and other technologies were evaluated, and the basins proved to be efficient in removing contaminants for stormwater. Addressing stormwater in another way would require a complete rebuilding and retrofitting of the remedial infrastructure, with uncertainty that it would be more effective than the stormwater basins.

Diverting stormwater to the underground workings was considered as was drilling or installing pipelines across the Butte Hill. Unfortunately, most of the shafts are too far uphill and therefore cannot be used to divert contaminated stormwater that flows in areas below those shafts. Additionally, use of mine shafts for the diversion of stormwater may cause unpredictable fluctuation of water levels in the underground mine workings, leading to unforeseen mine shaft collapses.



Stormwater channels that divert stormwater from upper Butte Hill to the Berkeley Pit via gravity have already been implemented as part of the prior Superfund efforts to address contaminated stormwater. Thus, the basins in Silver Bow Creek above its confluence with Blacktail Creek are necessary to address stormwater that is too far downhill to route to the Berkeley Pit to the east or to Missoula Gulch in the west.

Alternatives such as those described in the comment also require perpetual operations and maintenance. The BMPs will be managed as long as needed to control stormwater and prevent adverse impacts to surface water. It is anticipated that operation and management of all stormwater BMPs will occur for the foreseeable future.

Stormwater retention/detention basins can be managed in such a way as to reduce the likelihood of mosquitos breeding or can be treated with larvicide; these are common practices. Additionally, Montana does not have mosquitos that carry the Zika virus, according to the Montana Department of Health and Human Services and end land use, features such as recirculating water between the basins will provide for water in the basins that is not stagnant, further reducing the potential for mosquito problems. While the basins will be lined to keep them from discharging to contaminated groundwater, there are technologies that allow for vegetation to be planted above a liner.

Regarding additional detention/retention basins (Comment 7.6), stormwater from the areas described will be collected and routed to the Diggings East stormwater detention/retention basin for treatment and management, thereby minimizing adverse effects to Silver Bow Creek. EPA will consider implementation of the suggested BMP at or near the Anderson Shaft but does not agree that it can be a replacement for the proposed catch basins.

Upgradient source investigations of contaminated stormwater sources are currently being conducted by EPA as part of the West Side Soils Operable Unit remedial investigation/feasibility study and may be addressed under the response actions selected for the operable unit. Even so, stormwater controls within BPSOU are required to protect human health and the environment and to meet in-stream ARARs.

The proposed plan states twice that expanded waste removals in the area to be occupied by basins was in response to public input. This part of the proposed plan was not intended to reference the stormwater basins



themselves but rather the removal of Diggings East and the Northside Tailings. As noted above, these remedial actions are also necessary for protectiveness and are in response to the need to control stormwater as required in the 2006/2011 BPSOU Record of Decision.

### 2.29.3 Other

#### 2.29.3.1 Comment Summary

Four comments were received that had a question or request about the retention/detention basins. The comments addressed effectiveness, impact of recirculation on treatment, storage capacity, impact on future construction of the Silver Bow Creek channel above its confluence with Blacktail Creek, and opportunities to site basins in other areas.

- **Comment 22.3.** “1.2 In contrast to language in the Proposed Plan, CTEC recommends emphasizing the effectiveness of retention rather than detention. The Proposed Plan consistently refers to detention stormwater basins, when in fact the series of three stormwater ponds in Missoula Gulch clearly demonstrate the retention is responsible for removing approximately 95% of total recoverable copper, and that includes removing roughly 60% of the dissolved copper fraction. Clearly there is more to treatment efficiency of these stormwater ponds than settling particles. The efficiency of retention can likely be attributed to a combination of retention time and some biological-chemical component. CTEC recommends that the optimization and operations plan for these ponds recognize those factors. ... 4.2 It needs to be determined if the proposed recirculating water features within the stormwater basins will negatively affect treatment. It appears that widespread community interest in the recirculating water features is lacking. If water recirculation will truly limit the potential for mosquito breeding, this may be reason enough to incorporate a pump-back system into the storm system. However, CTEC is unaware of information describing how the water recirculation may affect chemical conditions and metal precipitation within the ponds. If there is reasonable potential that recirculating the water could lead to lower stormwater treatment efficiency, then the money spent on these features would be better allocated towards the seed money proposed for Restore our Creek’s stream restoration goals.”
- **Comment 91.6.** “3. Is it premature to eliminate contingencies for chemical water treatment of storm water until the effectiveness of the proposed passive treatment solution is known? Will alternatives such



as routing storm water from some under-remediated areas of BPSOU and West Side Soils to the Pit still be considered?”

- **Comment 98.28.** “N. Page 13, Column 2, Bullet 2. The Proposed Plan states: “Ponds would improve surface water quality ... [because] [w]ater storage would significantly reduce the number of times per year that storm water would be released to surface water, resulting in fewer potential exceedances of performance standards.” AR comments that the stormwater basins are not intended to provide water storage, but rather, to temporarily detain stormwater to allow for the settling out of sediments before releasing to the stream. Increased retention will decrease the available capacity of respective stormwater basins to accept flow and volume of the design criteria event. This could lead to additional and unnecessary stormwater discharge to SBC, from both the bypass structure and primary basin outlet, which could reduce overall aquatic health. Further, there are accepted engineering methods available to support basin operations in a manner that achieves both efficient treatment and ensures capacity will be available to capture and treat stormwater from subsequent events. Finally, it is important to balance basin design and operating parameters with site aesthetics and reuse opportunities for the community. Excessive basin sizes and/or retention periods will decrease these opportunities. Therefore, AR comments that it is important to consider site aesthetics and community acceptance when designing the stormwater basins.”
- **Comment 100.4.** “3. Stormwater. ROCC understands that stormwater detention ponds will be designed and sized to accommodate realignment of a restored creek in the reserved areas consistent with EPA's assertions that the remedy will 'not preclude the restoration of Silver Bow Creek.' To the extent that the location of the future restored Silver Bow Creek becomes known during the removal of the tailings and construction of the stormwater ponds, simultaneous contouring of the future Silver Bow Creek channel should occur. Stormwater design and function needs to compliment the park and be safe for the public to engage in activities in or near all waters. ... 8. Concentrations of Copper in Groundwater. Any contamination that may be kept from entering the Silver Bow Creek corridor will have a beneficial effect on the efficacy of the proposed remedy amendments. Opportunities to site stormwater basins in other areas (e.g. Greeley and Warren Avenue) that will enable a restored creek to



be located within the Silver Bow Creek Corridor should be considered; particularly if it provides a larger area be utilized for the creek.”

### **2.29.3.2 EPA Response**

EPA agrees that the stormwater retention/detention basins will not preclude the construction of a new lined creek in the corridor area. EPA, Butte Silver Bow, and Atlantic Richfield have designated certain areas under remedy in support of that vision (see Addendum 1 to Attachment C to Appendix D, the statement of work, which is part of the consent decree). Additionally, EPA has awarded Technical Assistance Group funding to further support the understanding of how the BPSOU remedy will not preclude the vision.

EPA also understands the concerns stated in these comments and will consider these and other factors during the remedial design studies and planning for the basins. The proposed stormwater retention/detention basins are necessary to handle storm flows and to remove contaminated suspended solids (via settling) while ensuring the basins are sized and operated properly to be protective of the creek. A recirculation system would keep the water from becoming stagnant but would not adversely impact the ability of the basins to remove suspended solids.

EPA agrees and expects that the basins will be designed and operated using, “accepted engineering methods available to support basin operations in a manner that achieves both efficient treatment and ensures capacity will be available to capture and treat stormwater from subsequent events” along with balancing “basin design and operating parameters with site aesthetics and reuse opportunities for the community.”

The basins in Silver Bow Creek above its confluence with Blacktail Creek will operate differently than the ones in Missoula Gulch. The Missoula Gulch basins act as retention basins, where water is almost never released and instead infiltrates to groundwater. Due to the groundwater conditions near the outlet of the existing stormwater infrastructure(s), the newly constructed basins will have to be lined to prevent contaminated stormwater from infiltrating and overloading the contaminated groundwater capture system and changing the groundwater flow regime. Thus, they will have to operate in part as detention and in part as retention basins, where after treatment via settling, the stormwater will have to be released to allow capacity for the next storm and water will not be stored indefinitely. Because the stormwater will be held for a short period to



attempt to achieve optimal settling, the stormwater released may enter Silver Bow Creek under chronic, normal flow conditions. This discharged water will have to be monitored and evaluated in design to determine the optimal rate of discharge for variable storm events.

Regarding opportunities to site additional basins (Comment 100.9), the Greeley (Texas) Avenue and Warren Avenue locations are at the top of the Silver Bow Creek corridor. If basins could be built just for these drainages, it would not eliminate the need to construct basins for drainages farther west and downstream in the corridor where additional contaminated stormwater control is needed. Throughout the last 20 plus years, EPA and many other stakeholders have evaluated the challenges of managing stormwater on the hill, including the Texas Avenue area. In fact, several site tours and coordination efforts with the community have been conducted to examine the efficacy of constructing basins on the hill. Based on these findings, EPA has concluded that because of the elevation of the existing infrastructure, gradient of the hill, and lack of space, the optimal location for the basins is at the bottom of the hill where the stormwater can best be managed.

## **2.30 Source Erosion to Surface Water**

### **2.30.1 Comment Summary**

Three comments were received regarding remaining areas in the BPSOU with exposed or partially covered mining waste that is vulnerable to erosion during stormwater events and/or contributes to groundwater contamination.

- **Comment 22.5.** “2.2 There are unreclaimed source areas at the Copper Mountain Recreation Complex associated with the Clark Mill tailings in the Grove Gulch watershed which must be reclaimed. These mill tailings are currently contributing to water quality exceedances in the watershed and present a risk to humans who contact the waste.”
- **Comment 31.4.** “2. Elevated Levels of Metals and Minerals as a result of Surface Water (Storm/Erosion). Today, all areas with exposed or partially covered mining waste have not been properly reclaimed or restored. These are areas that are either un-reclaimed or insufficiently reclaimed and contain clearly visible historic mine waste, in some cases near or bordering areas that until recently, were considered to be reclaimed. I am including an attachment with this record of input, APPENDIX A, which specifies in orange all areas of historic mine



dumps that were known to occur, as well as APPENDIX B, which is the 2019 Google Maps of the same area, and APPENDIX C, which shows an overhead view of the area to allow a person to compare past, historic mining activity and mine waste sites to present, currently active, mining activity and mine waste sites. The greatest accumulation of, mine waste is the area within the generalized 'boundaries' of the named streets of the Butte Hill. Those are Clark Street to the North; Empire Street to the South but in some areas extending to Woolman Street; Alexander Street to the East, and generally Excelsior Ave. to the West. THESE BOUNDARIES SPECIFICALLY POINT TO CURRENT EXPOSED HISTORIC MINE TAILINGS AND DOES NOT FACTOR TAILINGS AND EXPOSED MINE WASTE BY ACTIVE MINING OPERATIONS OF MONTANA RESOURCES. This general area also includes the Alice Pit, an area that was formerly considered to be reclaimed, however it is now known to be a collection source for groundwater contamination.

“In addition to this area containing exposed mine waste, the collective majority of this area does not have sidewalks, curbs, gutters, or any form of modern storm water collection, retention, or diversion. Because there is not any acceptable form of engineered storm water collection, retention. or diversion. this area containing significant majority of historic mine dumps continues to actively contribute to elevated levels of metals and minerals in silver bow creek. As a side note, the map identifies the areas in orange as containing historic mine waste. Any intelligent person looking at the map would notice that the only areas that are not painted in orange include areas that are currently covered by homes, streets, or sidewalks. That is because the areas beneath the homes, streets and sidewalks were either not tested, or was considered "Waste in Place."

“I have personally been into the "Basement" and "Crawlspaces" of these homes as part of my job to install and maintain yard sprinkler systems. I can personally attest that the "Dirt" under some of these homes does not appear to be native soil, but rather disturbed soil, 'mine waste', that was left in place as structures were simply built right over the mine waste. Until recently, asphalt had been considered an adequate cover. However, it is now known that the contaminated areas beneath homes, streets and sidewalks contain a significant majority of historic mine waste, and is contributing to both surface and ground



water contamination. The community, ALL LEVELS OF GOVERNMENT, and ARCO need to find a way to acknowledge and agree that the area needs to be excavated and removed completely. This includes the complete removal of structures, streets, sidewalks, and all the mine waste beneath and around them. The Focus and Clean Up should be redirected at the Butte Hill.”

- **Comment 53.3.** “And you've heard them answer three or four times tonight, "Well, we don't know where the source is." I have a map here from a BNRC meeting back in 2011. And, even from a distance, you can probably see that top area is entirely orange. And that orange area is mine dump sites in Walkerville and Butte townships. So, what I'd like to focus our attention on is an area -- and I'll call general boundaries at the North Clark Street, the South Empire Street, some areas even further, maybe Woolman to the east, Alexander Street, and to the west, generally, Excelsior Avenue. These areas contain evidence of past mining activity, exposed evidence. They have homes that are eligible for RMAP cleanup. And the area, the entire area, could be described as insufficiently reclaimed or unreclaimed. And, even with the maps that they have given outside, it doesn't even so much as touch on any of this orange area that was provided in 2011 at a BNRC meeting. So, I'm going to clarify that I believe the past work of the engineers and planners was crappy and lazy. The source of the exposed surface metal and minerals has been ignored. All areas to date that have been cleaned up have involved very minimal amounts of personal and private property and residential homes. Most of the areas cleaned up to date have been large areas of land occupied by -- and they have not been occupied by personal or commercial dwellings or developed real estate. They have been areas that have been owned or controlled by corporate and government agencies requiring very minimal amounts of negotiation.”

### **2.30.2 EPA Response**

There are currently 600 acres of capped mine waste areas within the BPSOU. These areas were selected for capping based on the exceedance of human health-based concentrations of contaminants of concern in these areas and/or the contribution of these areas to surface water contamination. Under the BRES program required by the 2006/2011 BPSOU Record of Decision and implemented by Butte Silver Bow County in cooperation with the Clark Fork Watershed Education Program, one quarter of all reclaimed areas are evaluated each year on a



revolving basis, and any problems with site capping or revegetation issues for the remedy are addressed. The BRES program provides a framework so that site managers can determine if the cover over the mine waste is intact and vegetation is adequate. If problems are found under the BRES evaluation, they are corrected under work plans approved by EPA. These covers are a barrier between people and the mine waste (preventing exposure by ingestion or dust inhalation) and also prevent rainfall from moving contamination from these areas into surface water through storm events. The BRES program has undergone significant revisions over the years, which has resulted in an improved BRES program that verifies long-term protection of human health and the environment within BPSOU.

Additionally, the 2020 Record of Decision Amendment will require the responsible parties to investigate and reclaim several insufficiently reclaimed or unreclaimed mine waste source areas. See Appendix D to the consent decree, Attachment C for a list of these sites. Furthermore, the development of a solid media management plan will provide a systematic approach for areas that are unknown at this time to be contaminated with historic mine waste but which may be discovered. The approach will include at a minimum an assessment and remediation if necessary.

EPA agrees that areas beneath many of the existing residences and buildings may contain contaminated mining waste. This material cannot be feasibly removed and may be contributing to alluvial groundwater contamination within BPSOU. The many sources of mine waste contamination within BPSOU, due to the extensive mining, milling, and smelting that occurred within Butte over a long period, are why the remedy requires contaminated groundwater to be intercepted, pumped, and treated before it contaminates Blacktail Creek and Silver Bow Creek below its confluence with Blacktail Creek surface water and in-stream sediments within the BPSOU. As for this commenter's suggestion that Butte Hill be largely excavated, see Section 2.34.5 Technical Impracticability Waiver, Other.

Finally, under the uncaptured surface flow areas remedial elements work plan, areas adjacent to the Clark Mill tailings cap will be assessed and the appropriate BMPs applied.



## 2.31 Subdrain

### 2.31.1 Comment Summary

Two comments were received on the subdrain. One stated that the technology will not work, and the other stated that EPA failed to mention two items as minor modifications relating to the subdrain in the proposed plan.

- **Comment 41.10.** “The French drain, the French drain, as we all know, everyone knows, the State of Montana is adamant that it doesn't work as well as the EPA and ARCO says it does. We need to address that issue. We need to address that issue. It has to be jetted and cleaned six times a year, because it clogs up, with a chemical precipitate. And it - the rocks that encase the pipe are also being plugged, I'm sure. And, eventually, the drain will have to be removed.”
- **Comment 98.30.** “P. Pages 16 & 19 (Minor Modifications Section). EPA failed to include the following additional “modifications” to the ROD in the Proposed Plan:
  1. A change to the description in Section 12.3.2 of the ROD of when treatment system discharge performance standards are applicable to the BTL to: 1) clarify they are not applicable until after post-final construction shakedown period; and 2) provide flexibility on the five-year shakedown period length referenced in the ROD; and
  2. A change to Section 12.3.2.3 of the ROD requiring use of a tracer dye methodology to monitor flow and loads annually in the SBC storm channel; EPA subsequently approved AR's use of flow meters for monitoring. AR requests that EPA identify and describe these changes in the Amended ROD.”

### 2.31.2 EPA Response

EPA is confident that the BPSOU subdrain method of capturing contaminated groundwater is proven and has worked and will continue to work at the BPSOU to intercept and collect contaminated groundwater. Based on investigations conducted after installation of the subdrain, additional contaminated groundwater collection is now being required by EPA as the contingency for such actions described in the 2006 BPSOU Record of Decision has been invoked in the 2020 BPSOU Record of Decision Amendment. EPA recognizes that actions described in the proposed plan will change the quantity and quality of influent water to be treated at the Butte Treatment Lagoons. As such, the shakedown period



and applicability of ARARs will be reassessed as part of any enforcement mechanism EPA utilizes to implement the amended remedy. The requirement for the BPSOU subdrain dye tracer monitoring was modified as requested in EPA's 2011 BPSOU ESD.

## **2.32 Surface Water Management Plan**

### **2.32.1 Comment Summary**

One comment was received, requesting that EPA consider a multiple-lines-of-evidence approach in determining if and when removal of bed sediment is necessary.

- **Comment 98.29.** "O. Page 14, Column 1, Paragraph 2. The Proposed Plan states: "Recontaminated bed sediment would be removed, if necessary, resulting in a notable improvement in long-term effectiveness and permanence." AR comments that it is important that a multiple-lines-of-evidence approach be agreed to for determining if and when it is necessary to remove re-contaminated bed sediment. AR believes such criteria should be defined in the Surface Water Management Plan that is part of the RD/RA Statement of Work to be attached to a final CD. In assessing whether sediment removal (post-remedy construction) is appropriate, EPA must consider a multiple-lines-of-evidence approach that includes:
  - Establishment of sediment re-removal criteria that consider precedent of similar removal actions conducted in the Clark Fork River basin, adopted from those criteria applied at either Streamside Tailings, Mill-Willow Bypass, or Milltown Reservoir;
  - Whether or not the established sediment screening concentrations in reconstructed stream segments are significantly higher than reference concentrations upstream of BPSOU;
  - A weight-of-evidence approach for site-specific assessment of potential hazards associated with any sediment concentrations that exceed established re-removal criteria, including:
    - Assessment of benthic macroinvertebrate community health that includes consideration of the metal tolerance index,
    - Assessment of sediment/pore-water chemistry and bioavailability that provides mechanistic interpretation of effects or lack of effects of contaminated sediments, and
    - Completion of site-specific toxicity assays to validate any predicted effects or lack of effects of contaminate sediments.



- Consideration of other data (e.g., near-stream groundwater COC concentrations and gradients) that can confirm an historic mining-related source was the cause of any exceedance of established re-removal criteria and resulted in impairment of the stream in accordance with the above weight-of-evidence approach.”

### **2.32.2 EPA Response**

As a part of determining if and when removal of recontaminated sediment is required, EPA will consider Probable Effects Concentration sediment reference values listed in the surface water management plan; trends in sediment concentrations; contaminated groundwater concentration, location, and gradient data; biological data; and actions completed to control and prevent recontamination from surface and groundwater contaminant sources. Further information is provided in the surface water management plan, which is attached to the proposed consent decree.

## **2.33 Technical Text and Figure Changes for the 2020 Record of Decision Amendment**

### **2.33.1 Comment Summary with EPA Responses**

Twelve comments offered suggestions for changes to text, figures, or monitoring station locations that were found in the proposed plan. Those comments are shown below, and EPA’s response is provided immediately after each comment.

- **Comment 22.13.** “Figure 1. Hydrolab cross-sectional profiles demonstrate the lack of mixing between Silver Bow Creek water and BSB Sewage Treatment plant discharge at the current ISCO location for Station SS-07 (blue line). CTEC’s proposed location, shown in red, is located approximately ½ mile downstream and shows the two streams are mixed.”

**EPA Response.** The location of SS-07 is at the downstream edge of BPSOU and the upstream edge of Streamside Tailings Operable Unit, making it an ideal location for monitoring. The physical constraints described in the comment can be overcome and do not outweigh the advantages of leaving the site boundary at its current location.

- **Comment 23.1.** “Please include the attached comments as part of the Public Record on the Butte Priority Soils Operable Unit Proposed Record of Decision Amendment. I have attached a map of Butte Priority Soils Boundary. Since EPA, State of Montana and the Butte Silver Bow Local Government have agreed to take Arco/BP off the



hook for the cleanup and restoration of the iconic Silver Bow Creek and thus claimed it if not part of the Creek and Butte Priority Soils, which is totally false, I felt it essential that the map of Butte Priority Soils be included in the public process.”

**EPA Response.** The attachments have been entered into the administrative record as part of Comment 23. A BPSOU boundary map that includes Silver Bow Creek above its confluence with Blacktail Creek should be included in the 2020 BPSOU Record of Decision Amendment.

- **Comment 43.2.** “As I read through the language provided concerning the ROD amendments, I, and others I've spoken to, found that the language referencing Silver Bow Creek confusing. Sometimes the language represented Silver Bow Creek and other times Upper Silver Bow Creek, sometimes with a small U, sometimes with a capital U. It's unclear what the description "Upper Silver Bow Creek" comprises, where it begins, where it ends and whether the language refers to different stretches of Silver Bow Creek or refers to different stretches of Silver Bow Creek in different parts of the ROD. Language is important. I mean, this is a document that's going to guide us, and so we ought to know what we're talking about and not just bandy about on vague terms. The current legal description of Silver Bow Creek is that it begins at Texas Avenue and continues until it joins Warm Springs Creek and becomes the Clark Fork River. When describing the Silver Bow Creek, a better approach would be to include delineating language so there is no ambiguity about portions of Silver Bow Creek up for discussion. And, as Evan pointed out, for example, Silver Bow Creek west of the confluence of Blacktail Creek to Montana Street, or Silver Bow Creek between Montana Street and Casey Street, etc. I hope that the amendments to the ROD include these clarifying changes and language so that the public, when they read these documents and are invited to have a comment on them, can know what the heck they're talking about. That's all I've got.”

**Response:** EPA now refers to the historically termed Metro Storm Drain (or MSD) channel—that is, the area between the Montana Resources, LLP property boundary near Texas Avenue and the confluence of Blacktail Creek with Silver Bow Creek—as “Silver Bow Creek above its confluence with Blacktail Creek.” Silver Bow Creek from the confluence with Blacktail Creek is referred to as “Silver Bow Creek below its confluence with Blacktail Creek” or



similar language. The 2020 BPSOU Record of Decision Amendment will use these terms consistently.

- Comment 98.7.** “A. Incorporation of AR’s Comments on the 2004 Proposed Plan, 2006 ROD, and 2011 ESD. On December 20, 2004, EPA released a Proposed Plan (2004 Proposed Plan) identifying the agency’s preferred remedy alternative to address contaminated solid media (mine waste, soil, and residential soil and dust), surface water (base flow and stormwater), and groundwater at the BPSOU. AR submitted significant written comments on the 2004 Proposed Plan to EPA in February 2005. In September 2006, EPA issued the ROD, which selected a comprehensive remedy for the BPSOU, largely adopting EPA’s preferred alternative in the 2004 Proposed Plan. AR submitted additional comments on the ROD to EPA on December 3, 2008, via a letter and attachment titled “BPSOU ROD Requirements - Points Requiring Clarification.” The ROD was amended by EPA in the 2011 ESD. AR submitted comments on the ESD with its Notice of Intent to Comply with the 2011 Unilateral Administrative Order on September 17, 2011. EPA’s April 11, 2019 Proposed Plan identifies several changes to the ROD (as modified by the ESD), which is the primary focus of AR’s comments included herein. The 2019 Proposed Plan, however, makes clear that “[a]ll other components of the 2006/2011 ROD not specifically addressed in this document or the amended ROD remain in effect.” 2019 Proposed Plan at 19. To the extent elements of the ROD are unchanged by the 2019 Proposed Plan (and expected Amended ROD), and therefore would remain in effect going forward, AR reasserts any and all comments from its February 2005, December 3, 2008, and September 17, 2011 submissions applicable to such elements of the ROD. AR therefore reiterates and incorporates herein by reference those comments included in its previous submissions that apply to unchanged elements of the Remedy, some of which are discussed in more detail herein. AR’s general support for the modifications identified in the 2019 Proposed Plan does not amount to a withdrawal or waiver of its previous comments on and objections to the ROD and/or unconditional support for all portions of the ROD that would remain in effect.”

**EPA Response:** EPA has reviewed the documents referenced by Atlantic Richfield in this comment and has appropriately addressed issues needing clarification in the 2020 BPSOU Record of Decision Amendment.



- Comment 98.16.** “B. Page 3, Figure 1. Figure 1 of the Proposed Plan depicts the various operable units (OUs) of the Silver Bow Creek/Butte Area Superfund Site, including the West Side Soils Operable Unit (WSSOU). The WSSOU includes mining-impacted areas in and around the City of Butte that are not included in the BPSOU, the Butte Mine Flooding Operable Unit, or the Montana Resources’ active mine area (or any other OU for the Site). EPA is conducting the Remedial Investigation / Feasibility Study (RI/FS) for the WSSOU, which is in the initial stages of the RI. Figure 1 appears to depict areas that are or will be included in the WSSOU boundary, which includes areas immediately west of Butte and north of US Interstate I-90/I-15 and areas southeast of Butte and south of the active mine area. Delineation of the WSSOU boundary prior to completion of the RI/FS is premature. Furthermore, much of the area indicated as the WSSOU, particularly the areas southeast of Butte and south of the active mine area, may have little, if any, mining related impacts that require remediation. If EPA retains the depiction of the WSSOU on Figure 1 (or elsewhere), it should be identified as “preliminary” or “to be determined” and subject to change following the RI/FS.”

**EPA Response.** In the 2020 BPSOU Record of Decision Amendment, EPA will revise the legend text for the West Side Soils Operable unit to clearly note that the boundary for the West Side Soils Operable Unit is “preliminary” and that the operable unit’s boundary will not be finalized until the completion of the West Side Soils Operable Unit remedial investigation/feasibility study.

- Comment 98.19.** “E. Page 5, Column 2, First Bullet. The Proposed Plan states: The RAOs for surface water are to “[e]nsure that point source discharges from any water treatment facility (e.g., water treatment plant, wetland, etc.) meet end of- the-pipe water quality standards after construction and shakedown periods.” Wetlands are not point source discharges regulated under the Clean Water Act unless they are engineered and constructed as a treatment system with defined discharge points. EPA should replace “wetland” with “wetland engineered and constructed as a treatment facility.”

**EPA Response.** The commenter is correct in noting that wetlands are not point source discharges. The 2020 Record of Decision Amendment will not use that term when referring to end-of-pipe discharge standards.



- **Comment 98.25.** “K. Page 9, Second Numbered Paragraphs 1 through 3. The Proposed Plan states: “Implementation of the expanded work elements makes three components in the 2006/2011 ROD unnecessary. They would be removed as part of the final three significant changes,” including (1) “Remove the contingency to install a conventional treatment plant for chemical treatment of storm water; (2) “Remove the option for augmentation of flow to attain remedial goals”; and (3) “Remove the need to evaluate and implement infiltration barriers in the Diggings East and Northside Tailings areas, as these areas would be removed.” For the reasons identified in the Proposed Plan and discussed in AR’s opening statement, AR agrees that the requirement for conventional treatment of storm water should be removed from the remedy as unreasonable and unnecessary. AR also agrees that the other two identified remedy components—flow augmentation and infiltration barriers—should be removed from the 2006/2011 ROD. These potential actions are subsumed by, or not relevant if, the surface water remedy elements described in the Proposed Plan are adopted in the Amended ROD. Specific to the 2006/2011 ROD, the Proposed Plan only refers to removing the need to evaluate infiltration barriers in the Diggings East and Northside Tailings areas. The 2006/2011 ROD included a requirement for assessment of an infiltration barrier in the Parrot Tailings area as well, where the State NRDP is carrying out a removal project. Thus, the Amended ROD should clarify that evaluation of infiltration barriers for each of the three areas described in the 2006/2011 ROD is removed and not part of the final remedy.”

**EPA Response.** The 2020 Record of Decision Amendment makes it clear that the three remedial components described in this comment are no longer required as part of the BPSOU remedy, including evaluation of infiltration barriers for the Parrot Tailings area.

- **Comment 98.27.** “M. Page 11, Text Row 3, Text Column 3, Bullet 1. The Proposed Plan states: “Construct final storm water controls (primarily detention ponds) to settle out contaminated suspended sediments from Buffalo Gulch and drainages reporting to upper Silver Bow Creek for 10-year storm event.” This text incorrectly suggests that all detention ponds for drainages reporting to upper SBC will be sized for the 10-year event. This is true only for the Buffalo Gulch and Diggings East basins. This does not apply to the Northside Tailings detention pond on East Buffalo Gulch, which will be sized for a 6-



month event. South of Silver Bow Creek, the Grove Gulch detention pond size is based on a fixed volume in general agreement with the 6-month design criteria while other Uncaptured Surface Flow Areas will be evaluated on a drainage-by-drainage basis, with the final BMP not to exceed 6-month design criteria. No other drainages outside of BPSOU will be considered as a component of the modified remedy. AR requests that EPA modify this text accordingly in the Amended ROD.”

**EPA Response.** The discussion of basin size in the 2020 BPSOU Record of Decision Amendment has been changed to read as follows: “Stormwater from the EBG subdrainage shall be diverted to a maintainable (concrete or concrete-like) basin or sedimentation bay located at the Northside Tailings, which shall be sized for a maximum 6-month, 24-hour Type I storm volume. In lieu of a larger basin, connection of the Northside Tailings basin or sedimentation bay with the stormwater basin(s) in Diggings East or Buffalo Gulch shall be included in the remedial design and construction. The final design shall be approved by EPA in consultation with Montana DEQ. Additional sediment storage volume beyond the stormwater capacity shall be included to maintain system performance and coincide with the O&M cleanout frequency, which shall occur a minimum of twice per year, or as necessary.”

- **Comment 98.31.** “Q. Page 16, Modification 3. The Proposed Plan states: “The prescriptive surface water monitoring of the 2006/2011 ROD (Section 12.6.6.2) will be simplified to points of compliance at SS-06G and SS-07 (Figure 5). Other monitoring stations will remain in the network as needed, but compliance will be determined at these two farthest downstream stations. Effluent from the Butte wastewater treatment plant enters between SS-06G and SS-07. The surface water sampling methodology will be modified to allow for additional compositing methods at the compliance sampling locations.” AR supports the deletion of the prescriptive monitoring program and in-stream compliance points and replacement with points of compliance at SS-06G and SS-07. AR requests that EPA include text indicating that AR may propose re-location and/or one or more new upstream compliance assessment monitoring station(s) to recognize significant changes to stream flow or water quality entering the BPSOU, which new upstream location(s) may replace or be proposed in addition to the existing upstream assessment station (SS-01).”



**EPA Response.** For compliance purposes, collection of an upstream sample is necessary, and it is anticipated that the upstream station will be at SS-01. The 2020 BPSOU Record of Decision Amendment is not so rigid that the upstream locations could not be modified if justified based on changed conditions if agreed to by EPA and Montana DEQ. That does not have to be recognized specifically in the amendment language.

- **Comment 98.31** “S. Page 16, Modification 6. The Proposed Plan states: “For compliance monitoring, wet weather flow conditions and wet weather events will be defined as when there is measurable outflow from any of the primary outlets of the following main existing or planned storm water ponds within the BPSOU: CB-9 in Missoula Gulch, the Diggings East basin, the Buffalo Gulch basin, and the East Buffalo Gulch/Northside Tailings basin.” AR requests that this text be revised to clarify that in addition to being outside wet weather flow (i.e., where there is measurable flow from one of the main basins), normal flow sampling for compliance assessment also excludes collection of samples for a period of at least 72 hours following a hydrologic change caused by a precipitation or snowmelt event or when one or more of the basins discharges. This period is required to allow for streams to return to normal flow conditions. AR also requests that the text be revised to indicate that this applies to “10-year” existing or planned basins only. Thus, AR requests that “the East Buffalo Gulch/Northside Tailings basin” be deleted from the text above.”

**EPA Response.** Regarding text modifications for the proposed plan, that document will not be modified and reissued. The details in the comment have been considered, and revised language, as appropriate, is included in the 2020 BPSOU Record of Decision Amendment and the definition of the “main basins.” As part of the consent decree and remedial design process, specific monitoring plans and related documents have been or will be developed that will address the detailed issues raised by some of these comments. The amendment itself does not need to specifically address such issues.

- **Comment 98.32.** “R. Page 16, Modification 1 & Figure 3. Modification 1 and Figure 3 of the Proposed Plan propose to “clarify and expand” the BPSOU boundary to “incorporate[] both banks of Grove Gulch to just upstream of its confluence with Blacktail Creek.”



AR agrees that the BPSOU boundary needs to be expanded to include Grove Gulch. A figure showing the required boundary adjustments, which differ slightly from Figure 3 of the Proposed Plan, is attached as Exhibit C to these comments. AR requests the EPA incorporate the boundary adjustments as depicted on Exhibit C into the Amended ROD.”

**EPA Response:** Based on the sizing requirement for the Grove Gulch stormwater basin, EPA plans to make minor adjustments to the BPSOU boundary, as presented in the 2019 Proposed Plan to Amend the 2006/2011 Record of Decision, in the vicinity of Grove Gulch. The final boundary adjustment in the Grove Gulch area is part of the 2020 BPSOU Record of Decision Amendment.

- **Comment 100.5.** “4. Simplify compliance determination. The 2006/2011 ROD specified a flow-weighted concentration approach to determining compliance with water quality standards. ROCC asks for assurance that the modified approach for selecting points of compliance will not affect the ability to restore Silver Bow Creek.”

**EPA Response.** The flow-weighted average methodology specified in the 2006/2011 Record of Decision and proposed for change in the proposed plan was evaluated over the past several years. EPA found that it did not add any information that was not provided by an average value. In the interest of simplicity, the step for calculating flow-weighted average is proposed to be removed from the determination of compliance. This change has no effect on the ability of the community to develop and implement a lined creek in Silver Bow Creek above its confluence with Blacktail Creek as part of the end land use planning for this area.

## 2.34 TI Waiver

### 2.34.1 Supports Proposed Plan

#### 2.34.1.1 Comment Summary

Ten comments were received in support of the TI waiver as described in the proposed plan.

- **Comment 4.2.** “It is unfortunate when a protective water standard cannot be met. But, not all harms have a make whole remedy available, i.e. not all environmental harms can be fixed. If a particular water quality standard can’t be met and there is an equivalent protective standard that can be met, it makes sense to waive



compliance with the standard that can't be met in favor of compliance with a standard that is equally protective and can be met. Such would appear to be the case here with regard to the TI Waiver in the proposed BPSOU plan. The TI Waiver document provides abundant support for the TI Waiver.”

- **Comment 5.4.** “The Technical Impracticability Waiver to federal standards for copper and zinc during wet weather conditions is justifiable for many reasons, including the background contamination from heavily mineralized sources along upper Blacktail Creek. I believe this has been more than adequately explained to the public and that comments criticizing the waiver are unjustified. I also understand the need for potential waivers in the future, after several years of monitoring, if the state standards cannot be met under certain conditions along the BPSOU corridor.”
- **Comment 15.2.** “I’m in favor of the recently published proposed plan amendment. This includes the up front TI waiver for wet weather flow conditions for copper and zinc (to Fed ambient water standards). The watershed has already responding to the significant improvements that have occurred, which includes not just the base flow data, but certain habitat improvements as well.”
- **Comment 37.4.** “Regarding the fundamental proposed change of waiving the State of Montana DEQ-7 acute aquatic life standards and defaulting to the Federal dissolved standards due to technological impracticability, FWP believes that this is likely reasonable given our understanding of the problem.”
- **Comment 55.2.** “And so we're aware in this proposed plan there's a waiver of -- there's a technical impracticability waiver, the total recoverable standard going to the federal standard. There is actually good reason for that. It's well-founded. And the way it's structured right now is simply copper and zinc during storms. Then there is a requirement for a lot of additional work. And I'd like to mention some of that additional work.”
- **Comment 65.7.** “Regarding subject matter experts, I feel, as one, that I would consider myself a part of that group with my experience, background, training and education, that they are substantially in alignment, that this plan achieves the remedial objectives of the site, that the revisions to the ROD are totally appropriate, fair and keep our



fish and our folks safe under the federal water quality standard, which is a scientifically derived standard, as well.”

- **Comment 80.3.** “I support the TI waiver for Wet Weather and understand its necessity. My hope is in the end, the remediation activities to be undertaken will negate the need for this waiver in perpetuity.”
- **Comment 96.13.** “3) In-Stream Water Quality Standards. Butte-Silver Bow understands the data-driven and science-based justifications for the limited use of proposed waivers of Montana water quality standards during storm events (for copper and zinc only) and replacement with the federal standard. It is noteworthy that similar waivers apply to the Clark Fork River below the Warm Springs Ponds for chronic conditions (meaning at all times, not just during storm events) and are deemed protective. Given the substantial work accomplished in the summit valley over the past twenty years and subsequent improvements to water quality in Silver Bow Creek, the application of federal standards during storm events, as outlined in the Proposed Plan, does not compromise broadly supported objectives to sustain and protect the aquatic conditions in Silver Bow Creek. Precisely, due to the work accomplished over the past 20 years and the additional work described in the Proposed Plan, including further reclamation, improving previously reclaimed sites, expanding stormwater controls, and implementing additional ground water capture, Butte-Silver Bow concurs that the water quality standards to be used to measure effectiveness of the remedial actions are reasonable.”
- **Comment 98.4.** “BPSOU Subdrain & Groundwater TI Waiver. The BPSOU Subdrain system, constructed during the 2003-2005 period, effectively captures contaminated groundwater that would otherwise reach and impact water quality in SBC, and therefore is an important element of the BPSOU remedy. Metals from historic mining sources are broadly dispersed within the alluvial aquifer in Butte. And broad areas of city streets, municipal infrastructure, and commercial development overlie buried waste from historical mining activities. These conditions make it necessary to capture and treat a significant amount of impacted groundwater in the BPSOU and supported the EPA’s technical impracticability (TI) waiver of cleanup standards for the alluvial aquifer adopted in the 2006 ROD. The groundwater TI waiver remains in place as part of the BPSOU remedy under EPA’s



Proposed Plan. See Proposed Plan at 14 (“No changes are needed for groundwater because those standards were waived for the BPSOU alluvial aquifer in the 2006 ROD.”). The boundary in the 2006 ROD was established with incomplete information. AR supports EPA’s confirmation of the groundwater TI waiver, but requests that the TI zone boundary in the Amended ROD be revised to reflect data collected since the 2006 ROD. The revised boundary must be based upon the results of groundwater sampling at point of compliance monitoring wells established after the 2006 ROD. AR has prepared a technical memo to summarize this new data—which is dated July 21, 2016, and was resubmitted to EPA on June 17, 2019—that supports and proposes a TI zone boundary adjustment. At a minimum, new point of compliance monitoring wells need to be established, and AR intends to propose establishment of such wells in a future revision of the BPSOU Groundwater Quality Assurance Project Plan (QAPP).

“Upgrades to the BPSOU Subdrain system have been completed by AR since 2006 to improve groundwater capture and further reduce contamination of surface water from groundwater discharges. These improvements include installation of a dry vault, pumping and electrical system upgrades, boring a secondary (i.e., bypass) discharge pipe to the Butte Treatment Lagoons (BTL), improving sections of the surface ditch to minimize infiltration of surface water, and updated O&M practices such as semi-annual jetting and pigging of the collection and transmission piping system to reduce scaling. In addition to these Subdrain system improvements, the Hydraulic Control Channel (HCC) system was extended eastward as part of the Lower Area One (LAO) groundwater collection system. Installation and operation of the BPSOU Subdrain and the LAO collection system to intercept groundwater have resulted in significant surface water quality improvements. EPA now proposes to further expand the existing groundwater control and capture system along Blacktail Creek and through the BRW and Slag Canyon area to intercept additional contaminated groundwater and route the captured groundwater to the BTL for treatment. See Proposed Plan at 9 & 11, tbl. 2. AR generally supports these proposed actions as part of a comprehensive approach to improving surface water quality in Blacktail and Silver Bow Creeks, so long as they are incorporated in a final agreement and CD to implement the Proposed Plan on terms that are agreed to by AR and the other CD Parties. Additional capture will further reduce loading from groundwater to surface water and



help achieve RAOs and increase the protectiveness of the BPSOU remedy.”

- **Comment 98.5.** “Surface Water TI Waiver. Notwithstanding the above-mentioned additional remedial actions that will enhance the surface water remedy, in tandem with the many remedial elements that are already in place, EPA has determined—based on a surface water TI evaluation issued in 2018—that total recoverable copper and zinc concentrations in surface water will not meet Montana DEQ-7 acute water quality standards during most wet weather flow conditions. See Proposed Plan at 6-8. Accordingly, EPA has proposed an up-front waiver of these standards due to the technical impracticability of achieving them. *Id.* at 6-8 & table 1. AR supports most of the conclusions of the surface water TI evaluation (although based on hypothetical removal efficiencies) and fully supports the immediate waiver of these state surface water quality standards. AR also supports EPA’s proposal to replace the waived standards with the corresponding federal water quality standards for copper and zinc in SBC (subject to further comments specific to use of the Biotic Ligand Model below), which are also hardness-based, but measured as dissolved rather than total recoverable metals. *Id.* The federal standards are the same standards that are used to protect nearly all streams in the U.S., and the federal standard for copper has been adopted for the Clark Fork River Operable Unit downstream of Butte. Thus, the replacement standards are fully protective of human health and the environment at the BPSOU. Finally, AR supports EPA’s proposed process for possible post-construction waivers of additional Montana DEQ-7 surface water standards and identification of replacement standards where the proposed further remedial actions do not achieve compliance with in-stream performance standards.”

#### **2.34.1.2 EPA Response**

The support for the TI waiver as described in the proposed plan is noted. EPA believes that the up-front waiver to federal standards for copper and zinc in wet weather conditions is scientifically supported and the best path forward for protecting human health and the environment.

### **2.34.2 Against Proposed Plan**

#### **2.34.2.1 Comment Summary**

Eleven comments were received that were against the TI waiver as described in the proposed plan. They were against a waiver at any time.



There was some confusion in the standards used elsewhere and a sense that Butte was singled out for lesser protection.

- **Comment 1.1.** “Isn't that great can't meet standards, so decrease standard. Great idea, come on we can do better than this !!!!!!!!!!!!!!!”
- **Comment 2.5.** “#4. The document lowers discharge standards at the Headwaters of the Columbia and Clark Fork River Basins for the discharge of Berkeley Pit water---How crazy if that? As the old adage goes---“The solution to pollution is dilution! ... In addition, the new proposal for lowering the proposed water discharge standards to Silver Bow Creek is based on the fact as stated in your fact sheet--- That it is Technically Impracticable to meet the State discharge standards borders on criminal. Let me point out that in the 2006 Record of Decision the same claim was made on the removal of the Parrot Tailings. We now know through research by the Montana Bureau of Mines through requests from the Butte Natural Resource Damage Committee that claim is totally false!”
- **Comment 8.5.** “The plan’s discussion of waivers seems to be a one-way street that steers us down pathways for worst-case scenarios—declaring that if the anticipated improvements in water quality aren’t achieved as a result of the proposed remedies, then (instead of improving the remedies) more waivers may be required. I would hope that the plan’s final text as codified in the ROD and the CD makes it clear that future waivers will be a last resort—and specifies how adaptive management approaches will be used to refine remedial elements to ensure that they produce expected results.

“More pointedly, I would like to see the plan acknowledge the other side of the coin: what if, as everyone hopes, the proposed remedies (waste removals, stormwater and groundwater capture, etc.) are wildly successful, and water quality no longer suffers from high-flow exceedances? I’d like to see the plan explain under circumstances such as these, that the waiver could be dissolved (no pun intended), and water quality here could be assured on the same basis as that in the rest of the state—total suspended.”

- **Comment 31.3.** “1. TI – Technical Impracticability. It is my conclusion that the Modifications to the ROD are due to a lack of proper planning and execution of past cleanup activities by engineers



and contractors. Cleanup activities planned, presented, and executed by licensed engineers and engineering firms were haphazard, and without regard to sources of both groundwater and surface water metals and minerals that test outside of acceptable levels. Currently, there is nothing that is technically impractical. Technically impractical is an alternative way of saying that the planner, the plans, or those responsible to execute the plans are one or a combination of stupid, lazy or careless -"crappy". Proposed changes to 2006 ROD include contingencies that would lessen or eliminate standards for discharge, standards for measurable metals and minerals that occur during storm events, and requirements for infiltration barriers. That is not intelligent, diligent or a standard of excellence for the past, present or future of this area.

“Over the course of 30 years since cleanup activates began, representatives of local, state, and federal government as well as representatives of ARCO, unfortunately and unsystematically approved the cleanup plans that were being presented by licensed engineers. Those cleanup plans have been executed and we are dealing with the results of those cleanup plans at this very moment. I call the past 30 years the "stacked Band Aid approach" to cleanup. The wound was covered up with a band aid, with hopes that the wound will heal itself. The wound was not sterilized, nor investigated to determine the cause of the wound, it is just simply. It should be clear to any intelligent person that the Technical Impracticality would not exist had engineers planned cleanup in a more methodical and logical manner.”

- **Comment 31.9.** “So what should be considered? The past 30 years have included a significant amount of cleanup activity-that cannot be denied. Rivers, streams, banks, and plains have been cleaned up and a dam has been removed. However, the current plans allows for the accumulation of metals and minerals to accumulate and be deposited indefinitely, until at some point in the future, something will lead to a discovery being made that either the estuary of the Columbia, or a damn along the river, contains elevated levels of metals and minerals -because in 2019, the government as a whole accepted an amended and inadequate plan to clean up the Butte Hill, because the necessary plan was technically impractical. When cleanup was proposed and planned over 30 years ago, it was probably unfathomable to think that all areas containing toxic metals and minerals from past mining



activity, including miles of stream bed, hillsides, dams, roads, and railroad beds, would be entirely excavated and restored, reseeded, and planted with native plant materials. If you would have went to an auditorium room full of intelligent people in 1985 and told them that cleanup was being planned, and in 35 years, in the year 2020, almost 80% of the waste and crap would be cleaned up, everything but the source of the contamination, they would probably not believe it.”

- **Comment 34.2.** “1. I am concerned about relaxing any health and safety standards so that allowed contaminant levels are higher than are considered safe for human exposure according to national standards applied in other communities. The same applies to environmental exposures and levels that are above standards that are considered unsafe for fish and other animals. Butte residents and visitors and local wildlife and fish should benefit from the same environmental protections as apply in the rest of the United States.”
- **Comment 42.2.** “You're stating with the waiver that the engineers and contractors have done a crappy job for 30 years, and now that their bills have been paid and hands have been washed and they're ready to retire to Arizona, you're going to waive the standards. Just because you spend a billion dollars doesn't mean you did a good job. You did a job that requires the use of an acronym, "TI." I'm not blaming the EPA or ARCO. I think the folks responsible to create the long-term documents specifying cleanup have done a poor, inadequate, crappy job meant to create their own job stability. And that's all I have.”
- **Comment 58.5.** “And lowering the water discharge standard to allow for discharge of contaminated storm water, and, by the way, Berkeley Pit water that will be discharged in Silver Bow Creek, is even crazier. I mean, how could we lower these standards for our community and let us accept it? Not restoring our huge portion of Silver Bow Creek to a quality creek, where children can play and fish, is unconscionable, and it's wrong, and it should never be accepted.”
- **Comment 74.3.** “3. Waiver of water quality standards. One of the justifications of moving to federal standards rather than state standards is that aquatic life will not be adversely affected by the lowered standards. It is important to note that assertion ignores the sad story regarding the return of fish to the stream following remedy and restoration. While people are happy to see any fish at all in Silver Bow Creek, when compared to the baseline data for fish in the Father



Sheehan Park area of Blacktail Creek, the number of fish per mile downstream is only 10% of what it should be. It seems to me that the waiver request and the rhetoric behind the request, especially that it is not harmful to fish, is hiding the fact that the extensive work so far on Silver Bow Creek fisheries has not been the success that folks have envisioned, but has been a failure in numbers, something that cannot be aided in any way by a lessening of water quality standards.”

- **Comment 84.3.** “We absolutely should not settle for substandard water quality standards at any time. During a rain event or otherwise.”
- **Comment 87.2.** “Another comment I have is changing the water quality standard to meet what is needed to discharge the Berkeley pit water into the Silver Bow creek. I remember when a water treatment plant was built that would use high technology to discharge equal or above the water standard into the creek when the critical level was reached. They should be held to this, no excuse. If the DEQ insists on issuing a variance from water quality standards they should require nothing less than implementation of a pollution prevention plan during the entire duration of the variance!”

#### **2.34.2.2 EPA Response**

EPA appreciates and understands the concerns about the TI waiver expressed in the comments, and as stated in the proposed plan, EPA did not come to this decision lightly. In fact, it took years of evaluation of potential remedial technologies for stormwater on the Butte Hill along with furthering our understanding of water quality in Silver Bow Creek and Blacktail Creek during storm events to arrive at this conclusion that a limited waiver during storm events is justified.

From the early 1990s until today, multiple response actions have addressed surface water quality within BPSOU through contaminated groundwater capture and through several stormwater control features. These efforts allowed EPA, through the settling defendants’ surface water monitoring program and the state’s data collection along the creeks, to gather substantial data regarding the effects of these features on surface water quality. Significant gains in in-stream surface water quality improvements have been made and are shown through the data such that in-stream chronic standards are now met most of the time in the BPSOU surface water bodies. In-stream surface water quality during storm or snowmelt events has also improved.



However, in-stream surface water quality during some chronic flow events, storm events, and spring runoff continue to be out of compliance with the State of Montana DEQ-7 standards for copper and zinc. EPA, with assistance from Montana DEQ and the settling defendants, conducted a detailed TI waiver study, which used the large body of surface water monitoring data collected in BPSOU and developed numerical models to analyze the likely effects from various stormwater control efforts. The 2018 TI evaluation report, which is part of the administrative record for this 2020 BPSOU Record of Decision Amendment, shows that the acute copper and zinc standards will not be met in the BPSOU surface water bodies even with the construction of stormwater controls in every drainage basin within the BPSOU. This is due to the large quantities of stormwater or snowmelt that can occur in Butte, the steep gradient of hill on which the town of Butte exists, the effects of historical mining through uptown Butte, the small size of the surface water bodies within the BPSOU and contaminated surface water coming into the BPSOU from upstream areas.

Under CERCLA, where a site cannot meet cleanup standards due to technical impracticability from an engineering perspective, EPA may waive the standards and replace them with standards that are attainable. That is what EPA has done here. EPA is waiving the Montana DEQ-7 standards for copper and zinc in the up-front waiver described in the 2020 BPSOU Record of Decision Amendment based on the analysis contained in the 2018 TI evaluation report. The amendment replaces the state standards, which are based on the use of the total recoverable method for sampling surface water, with EPA-promulgated surface water quality criteria, which are based on the dissolved method of sampling. The federal dissolved criteria are protective of aquatic life when contaminated sediments do not exist in the water body. Sediments within BPSOU Silver Bow and Blacktail Creeks are currently contaminated and will be removed and replaced with suitable clean materials under the proposed action. Contaminant pathways to sediments (upstream contaminated sediments, contaminated stormwater and floodplain sediments, and contaminated groundwater discharge through the creek sediments) will be addressed under this proposed action. EPA believes the federal standards can be met through the implementation of the extensive stormwater controls and waste removals that are required under the amendment.



Montana DEQ concurs with this waiver based on the settling defendants' commitment to implement all technically practicable remediation measures described in the amendment, and further described in the consent decree and its attachments.

The initial TI waiver is limited and is strictly for waiving the total recoverable standards to dissolved standards during storm events for copper and zinc measured at the points of compliance (i.e., west end of BPSOU) in BPSOU. Contributions from BPSOU exacerbate these conditions. Because of this, a major source of the exceedances is outside of the control of any potential stormwater remediation that could be implemented as a part of BPSOU. In other words, even if all of the stormwater from the BPSOU was able to be captured and treated, Blacktail and Silver Bow Creeks would still have exceedances of the total recoverable copper and zinc standards over 80% of the time. Additionally, the discharge standards for the treated Berkeley Pit water are not being waived and will meet the standards developed in the 2002 Butte Mine Flooding Operable Unit consent decree.

The waived-to standards were recommended by EPA as being protective of aquatic life following strict methodologies involving review of toxicological studies. These recommendations were developed for implementation of the federal Clean Water Act and are independent of Superfund or BPSOU. The waived state standards are based on a different sampling methodology but are also protective. Most states have adopted the federal criteria as state standards. Currently, there are only 13 states in the United States that use either the total recoverable or a combination of dissolved and total recoverable standards.

As outlined in the compliance determination plan, which is attached to the proposed consent decree as Attachment A to Appendix D, additional waivers are possible if the DEQ-7 standards are exceeded more than once every 3 years on average, following the construction of key remedial elements and optimizing their performance.

In-stream ARAR standards were invoked for other operable units within the Clark Fork Basin Superfund sites, including the Clark Fork River and Milltown Reservoir Sediments operable units.



### 2.34.3 Wait to Grant Waivers

#### 2.34.3.1 Comment Summary

Nine comments were received with specific questions or suggestions related to the waiver as described in the proposed plan.

- **Comment 4.3.** “1. Can EPA clearly and convincingly demonstrate that all practicable and feasible ways of meeting the state standard have been considered and evaluated prior to waiving the state standard? Are we sure that everything has been tried before we waive the state standard? Is waiving the state standard the last resort? If the answer to these questions is not a resounding yes, I would ask that these interim measures be investigated and/or implemented before we waive the state standard. 2. There is concern if the laxer federal standards cannot be met, then what will EPA do?”
- **Comment 7.8.** “F. Waiver of water quality standards. 12. It is odd, even opportunistic of PRPs, to see that Waiver of State of Montana water quality standards have been agreed to BEFORE the work is done that will determine if such is needed (cart before the horse). With a Waiver to lower Federal Standards waiting in the wings, how might citizens believe that the best possible cleanup of soils contributing to toxic runoff will be thoroughly accomplished? I suggest that no waiver be allowed until AFTER all the capping of Under- and Unremediated soils is finished on the Butte Hill, and AFTER all possible stormwater diversions from the corridor are completed. Only then with appropriate real data (not assumptions) from WQ testing should a Waiver be considered. I ask that the State of Montana assure Butte citizens this caveat will be attached to any Waiver requirements.”
- **Comment 19.10.** “Question: what has received more effort: writing impracticability justifications or devising innovative, effective ways to improve water quality? On the central issue of adopting lower water quality standards, I stand firmly with those who think that the easiest course is being endorsed and will prevail. Try harder.”
- **Comment 38.1.** “Asking for the first change to the ROD to be a waiver from Montana State Standards to the Federal Standards absolutely should not happen until the work is completed removing all contamination from Casey Street to the Butte Reduction Works. The State is responsible for the removal of the Parrot Tailings behind the Civic Center and the Blacktail Berm. ARCO is responsible for the



Northside Tailings, the Diggings East tailings, the Butte Reduction works and the Silver Bow Creek Channel. The tailings need to be completely removed and water flowing before the tests can be performed to know that a TI is necessary. Since all that is planned is Storm Water Treatment ponds for 2 -3 storms that occur resulting in large amounts of contaminants being deposited by storm water.”

- **Comment 47.1.** “And I'm speaking as a member of the Silver Bow Creek Coalition, but I'm also speaking as a member of the Restore Our Creek group. But my main concern is addressed to the EPA, and that is because of your recommendations for the changes to the ROD. And it seems, to me, that when you are recommending immediately to do a waiver on the quality of the water that it's too quick. ARCO and the other responsible parties are going to be removing tailings. The State's going to continue to remove the tailings of the Parrot. With those removals of the tailings, if it's done correctly, there should be a flowing stream that is not contaminated to the extent that we would need total waivers. And my suggestion is you let the cleanup begin, and if we find, then, that, indeed, things are not changing, then perhaps we need to do some more engineering and more looking at other methods. Now, the Butte Priority Soils is going out around to the Greeley area. We know contamination is coming from that area. We need to know why. Why is there contamination in the storm water that comes from the Greeley area entering down through the corridor of Silver Bow Creek? And we need to make sure that we address that issue in a way maybe a little bit differently than we're doing now. And we need to also wait on the waiver, to see if there are any changes made because of all the good work that ARCO will be doing removing tailings, total removal of tailings. If that happens, there must be a difference in that creek corridor. EPA, I beg you, you do not go for the waiver at this point in time. Let's see what the cleanup will do for us, and then let's go for the waivers only if it's absolutely necessary.”
- **Comment 66.3.** “I agree there might need to be waivers, but let's not put the cart before the horse. Let's get some of the cleanup done and see what the results are of that cleanup that's being done to know whether we really do need to change from Montana standards to federal standards. Montana has stringent water standards because they want to preserve good water in our state. And so I don't think we lightly say, "Oh, sure, no problem. And if the first level isn't okay, come back and we'll give you another level." I don't think so. I think



we need to question some of those things and to say, "Do you really need it before the cleanup is started?" I agree there might need to be waivers, but let's not put the cart before the horse. Let's get some of the cleanup done and see what the results are of that cleanup that's being done to know whether we really do need to change from Montana standards to federal standards. Montana has stringent water standards because they want to preserve good water in our state. And so I don't think we lightly say, "Oh, sure, no problem. And if the first level isn't okay, come back and we'll give you another level." I don't think so. I think we need to question some of those things and to say, "Do you really need it before the cleanup is started?"

- **Comment 82.5.** "No change to the water quality discharge standards should take place until all work has been completed and all tailings removed!"
- **Comment 91.4.** "5. The remediated Creek should serve as the "canary in the mine" regarding the effectiveness of Butte's clean-up and detailed reports on creek status, fishery, and aquatic insect populations should be provided regularly to the Community. Is it premature to waive water quality standards before reviewing the effectiveness of the proposed passive treatment ponds? How certain are the EPA and State of Montana that the passive pond system will be protective?"
- **Comment 100.3.** "2. TI water quality waiver. The TI water quality waiver should incorporate EPA's assurances that it will not preclude the future restoration of a creek or the use of waters from clean, uncontaminated sources that could include Berkeley Pit and/or Silver Lake, or other sources. Further, the TI waiver should not be implemented until ARCO/BP (AR) has completed all remediation activity and evidence establishes that the waiver is still needed."

#### **2.34.3.2 EPA Response**

EPA appreciates and understands the concerns about the TI waiver for the State of Montana acute aquatic life standards for copper and zinc to the federal acute aquatic life standards expressed in the comments. As stated in the proposed plan, EPA did not come to this decision lightly and conducted a comprehensive evaluation of several years of data to determine that a waiver is justified in accordance with the CERCLA requirements for waivers of ARARs.



The waiver of in-stream, acute copper and zinc standards during wet weather conditions is a narrow and limited waiver. It applies only when stream conditions meet the definition of wet weather found in the 2020 BPSOU Record of Decision Amendment and does not apply during chronic or normal flow conditions when Montana water quality standards do apply. During wet weather or storm event conditions, large amounts of rainwater and/or snowmelt run down Butte Hill and flow into Blacktail Creek and Silver Bow Creek from its confluence with Blacktail Creek, which are the two surface water bodies where in-stream ARAR standards are promulgated. The volume of water from these events often overwhelms the waters that are in the surface water bodies when storm events occur. The water running off the Butte Hill becomes contaminated with copper and zinc from the many sources of such contaminants on the Butte Hill. The TI evaluation (EPA 2018b) and its detailed modeling demonstrated that no amount of stormwater controls applied on Butte Hill would result in achieving the Montana standards. Additionally, upstream contaminant of concern contributions from sources outside of the BPSOU contribute to the copper and zinc exceedances during storm events. This situation would occur no matter what was done to control stormwater within BPSOU.

The agencies think that the extensive stormwater controls that will be implemented pursuant to the 2020 BPSOU Record of Decision Amendment will achieve the federal water quality criteria that replace the waived standards. These standards, coupled with the removal of contaminated sediments, floodplain waste removals, and additional groundwater capture provided for in the amendment, should result in the protection of the environment within Blacktail Creek and Silver Bow Creek below its confluence with Blacktail Creek surface water bodies within the BPSOU. If not, then the compliance determination plan sets out a process for additional surface water quality waivers.

EPA believes that the stormwater retention/detention basins and other stormwater control measures required under the 2020 BPSOU Record of Decision Amendment and the consent decree statement of work will be very effective in reducing the amount of contamination entering the BPSOU surface water bodies of Blacktail Creek and Silver Bow Creek below its confluence with Blacktail Creek just as the stormwater basins in Missoula Gulch have proven to be very effective. The combination of hydraulic dynamic devices, forebays, retention/detention basins, floodplain waste removals, and additional capping of waste, combined



with other stormwater control features previously implemented within BPSOU, will prevent the vast majority of the contaminated sediments that currently enter the BPSOU surface water bodies from entering those surface water bodies, protecting Blacktail Creek and Silver Bow Creek from its confluence with Blacktail Creek from environmental harm caused by those sediments. Further, if future monitoring reveals that in-stream sediments are being recontaminated, an investigation will be triggered and corrective actions for the pathway(s) causing the contamination will be implemented as provided for in the BPSOU Surface Water Management Plan or the BPSOU Surface Water Compliance Determination Plan, depending on the media and pathway.

The 2020 BPSOU Record of Decision Amendment also provides for the possible waiver of other in-stream standards after remediation has been implemented and extensive monitoring occurs. However, future waivers will not be considered until the remedial elements are completed and shown to be functioning as designed; this is consistent with many of the comments. EPA believes that, aside from acute copper and zinc, the other in-stream standards can be met after the remaining remedial elements are constructed and does not think the future waivers will be triggered.

Finally, the TI waivers of in-stream standards will not prevent the construction of a lined creek in Silver Bow Creek above its confluence with Blacktail Creek, which could hold clean water if funding and a water source are found.

#### **2.34.4 Use Biotic Ligand Models Standards**

##### **2.34.4.1 Comment Summary**

One comment was received on use of the Biotic Ligand Model.

- **Comment 98.20.** “F. Page 5, Column 2, Paragraph 1. The Proposed Plan states that it leaves existing surface water RAOs “unchanged, except for the need to waive certain State of Montana DEQ-7 standards (Montana’s water quality standards), to be replaced by federal water quality criteria.” AR agrees that certain DEQ-7 standards should be waived, as described in the Proposed Plan, and replaced by federal water quality criteria for protection of aquatic life. Consistent with the stated approach, the DEQ standard for copper would be replaced with the current federal criteria for copper. The current federal criteria for copper is the Biotic Ligand Model which calculates a protective numeric criterion utilizing site-specific data. EPA recognizes the possibility that the BLM for copper could be the



replacement standard under Table 1, which confirms EPA's position that the BLM for copper meets the protectiveness criterion.

"H. Page 6, Column 2, Bullet. The Proposed Plan states: "Total recoverable copper and zinc water quality measurements are unlikely to meet Montana DEQ-7 acute water quality standards during most wet weather flow conditions, regardless of measures used to control COCs. Thus, these standards should be waived as technically impracticable and replaced. The replacements are called 'waived-to performance standards.' They use the same numerical standards, but the analysis is for dissolved metals, a dissolved conversion factor is applied, and there is no minimum or maximum value for hardness." AR agrees that the waived-to standards should be based on dissolved metals per the federal water quality criteria. However, AR maintains that the proper waived-to standard for copper should be derived using site-specific data based on EPA's Biotic Ligand Model (BLM) or another federally approved method for development of site-specific criteria. These federal standards are not only appropriate under EPA guidance, but are also equally protective of aquatic species. In fact, EPA states: "Since 2007, the BLM, a metal bioavailability model that uses receiving water body characteristics to develop site-specific water quality criteria, has been EPA's national recommended freshwater aquatic life criteria for copper.... The BLM represents the best current and available science, and EPA's scientific judgement is that application of this model is the best way to ensure that resulting criteria will be protective of aquatic life designated users." Letter from S. Garvin, U.S. EPA, R. Huffman, W.V. DEP, at 2 (July 19, 2016). AR requests that EPA clarify that waived-to standard for copper is based on EPA's BLM."

#### **2.34.4.2 EPA Response**

The State of Montana has delegated primacy for the Clean Water Act and has developed water quality standards that were approved by EPA. The State of Montana acknowledges the need for waivers of certain standards in this circumstance and has requested that EPA select hardness-based dissolved standards, which were identified as ARARs in the 2006 BPSOU Record of Decision, for replacement standards. EPA agrees with this approach. If appropriate, the Biotic Ligand Model standard, in place at the time of the compliance standard determination period, will be applied as a replacement standard if the dissolved standard cannot be met. See Attachments A, B, and C of the consent decree for further explanation.



## 2.34.5 Other

### 2.34.5.1 Comment Summary

Ten comments were received with specific questions or suggestions related to the waiver as described in the proposed plan.

- **Comment 31.3b.** “Additionally, while testing is in place to locate other sources of groundwater contamination, such as Timber Butte and the areas of Beef Trail that contain historic mining, milling, and smelting activity, responsibility parties have not been identified. The sources of the contamination, the metals, minerals, carcinogens, chemicals, etc. are not being properly acknowledged. I would suspect that is because a responsible party cannot be identified. It is also possible that there is an attempt to use the Technical Impracticability to deflect cleanup responsibility either in the short term or forever rather than identify sources of additional contamination, or force them to be cleaned up in a manner that would be publicly acceptable with regard to human health.”
- **Comment 37.5.** “However, we disagree with the EPA that the impact of this would be inconsequential to the health of fish and aquatic life in Silver Bow and Blacktail creeks. There is a significant amount of research that suggests elevated metals in sediments have chronic impacts to fish through prey consumption. The long-term effects of total recoverable metals exceedances above DEQ-7 could have chronic effects on fish and aquatic life.”
- **Comment 40.3.** “Any time an agency starts waiving standards, I immediately ask the question, “Well, how can something that is protective one day be waived to a more permissive standard another day and still be protective?” And I understand, I think, the technology -- or the technical arguments behind this. But I hope in the responsiveness summary drafts in response to my comments that there will be a strong justification of how the federal standards will be just as protective as the more stringent state standards. I think that needs to be clearly addressed, what impact will the lesser standards have on the cleanup downstream, and so forth, I think needs to be addressed.”
- **Comment 56.2.** “... [I]n terms of the TI waiver, I think it needs to be addressed in the responsiveness summary what will happen if you can't meet these federal standards. That needs to be specified, how far down the line do we go.”



- **Comment 63.3.** “What I'm struggling with is why the Parrot Tailings is not included and was not included in the TI modeling on -- for this waiver. And it's absolutely true. We can't go beyond what's the law. But we're here tonight because all the parties are asking us to change the law by changing the standard that, you know, is required for discharge in the creek. And, before we do that, it was told to us that everything but the kitchen sink was thrown into these models. Well, if the main focus of your remedy is removing tailings and replacing them with storm water features on the surface, why was the biggest, if you go down to that 1954 map, the biggest of all of those tailings was the Parrot Tailings? And so, I would strongly encourage all the parties realizing that the removal of those tailings has likely occurred after this proposed plan was first put -- first put together. I'd strongly encourage all the parties to go back and do some modeling that includes things like storm water catch basins where the Parrot Tailings are now.”
- **Comment 67.2.** “The question is, they have the words "sediment load." Is there a sediment load waiver for the Clark Fork and Milltown but Butte is a copper waiver, or are they talking about the same thing? I have a question on that one, their waivers. So, Butte's not unique on asking for a waiver, supposedly, to this one. It says the Clark Fork and Milltown have had waivers. But is it apples and oranges? And that was if somebody could say where does that copper come from, how do you fix the problem then? Having worked at the Sunlight at a cyanide mine, laid out all the buildings, all the dams, the impoundment pond, the slurry dikes, and all that, they controlled the cyanide. I don't think it's rocket science. Expensive. It may be expensive to get to that level in Butte. But I'd like to see if it was possible, the high and low extremes, what would it take to get to that point to collect that?”
- **Comment 69.1.** “If I understand correctly what was presented about the water quality standards, and I don't understand water quality standards, but if I understood what you said, the data proves that the quality standards cannot be met so you are asking for a waiver of the standards. Why should we settle for lowering the water quality standards that are already in place? And, if the waiver is not granted, how will you proceed?”
- **Comment 72.1.** “It says even though, generally, the differences in the degree of protectiveness between the federal dissolved and the State



total recoverable standards are small, that the water quality sample, based on the unfiltered, total recoverable measurement allows the State more control over sediment runoff in the waters of the State. My question is how small are these differences? I've been sitting here probably using up my whole family's data package searching the EPA website for some numbers, for some actual numbers. And you were asked a while ago and you threw out the number 30. Thirty what? Parts per million? And how does the State standard compare to the federal standard? I guess if we had some numbers, you know, how big of a leap are we taking here, you know, if we were to consent to this - - this adjustment. You know, is it a little different, like it says here, or is there a really big difference? And I know you can't compare dissolved versus particulates. It's like comparing apples and oranges. But we're not getting any numbers. And your slide doesn't show that.”

- **Comment 91.6.** “We need to question claims that Butte is such a highly mineralized area it cannot be cleaned to water quality standards. Several historical facts suggest water quality is not utterly linked to naturally occurring mineralization. The Brown's Gulch and German Gulch drainages provides fisheries despite draining similar mineralized areas. In fact, they actually improve water quality where they discharge to Silver Bow Creek. The Columbia Gardens initially included a fish hatchery and was located in the center of the current active mining area. The Olympia Brewery started in 1899 and was located near the location of the current. Met Tavern on Harrison Avenue along Silver Bow Creek, which is located in the center of the area under discussion. I cannot recall hearing "naturally occurring mineralization" arguments when other mining remediation projects in Southwest Montana are discussed or when volunteering time to the reconstruction of Butte's municipal water system. This calls into question whether the problem is naturally occurring mineralization or insufficient capping or removal of source areas in BPSOU and West Side Soils.”
- **Comment 98.21.** “G. Page 6, Column 2, Paragraph 1. The Proposed Plan states: “Even with this enhanced remediation, surface water data and current modeling evaluations indicate there is uncertainty as to whether remedial goals and ARAR standards for surface water (State of Montana DEQ-7 standards) could be met.” AR agrees that there is uncertainty (at a minimum) as to whether RAOs and ARAR standards for surface water will be met through construction and operation of



the revised remedy elements; AR suggests that the wording be modified to indicate that the modeling indicates it is improbable that RAOs will be achieved and all ARAR standards for surface water will be met in all conditions and at all times.”

#### **2.34.5.2 EPA Response**

EPA appreciates and understands the concerns expressed in the comments about the TI waiver of the acute standard for copper and zinc during storm events. As stated in the proposed plan, EPA did not come to this decision lightly. The TI waiver is largely a result of exceedances of the total recoverable standards for copper and zinc measured upstream in Blacktail Creek that are not part of the BPSOU and are thus outside of the control of what the agencies can require for cleanup. This is in part why the limited TI waiver is being granted prior to the completion of remedial elements in the corridor. It is not because of expense or lack of proper planning or cleanup work done to date.

However, future waivers will not be considered until all the remedial elements are completed and shown to be functioning as designed; this is consistent with many of these comments. EPA disagrees with the comment stating that it is improbable that remedial action objectives will be achieved and all ARAR standards for surface water will be met in all conditions and at all times. EPA believes this statement is premature and this determination cannot be made in a broad sense as suggested.

EPA believes that the stormwater basins will be effective, just as the stormwater basins in Missoula Gulch have been effective. The basins will retain the vast majority of the sediments, protecting Silver Bow Creek from those contaminated sediments. Additionally, contaminated sediments within Blacktail Creek and Silver Bow Creek below its confluence with Blacktail Creek will be removed so that a clean streambed in these areas will result. If future sediment or surface water monitoring reveals that cleaned up stream sediments are being recontaminated, sediment removal in the creek would be repeated and the sources/pathways of the contamination will be addressed. Furthermore, if a source is found that is loading sediments and negatively impacting the stream, that source will be remediated within the corridor.

As for the difference between the total recoverable and dissolved concentrations, it can vary greatly depending on the flow rate or agitation of water being sampled. Imagine a glass of water with some silt in the bottom of it. If you stir it and take a sample while it is cloudy, the total



recoverable concentration will be much greater than the dissolved concentration because of the sediment entrained in the water. The difference between total and dissolved could be several hundred parts per billion, or more. However, if you allow that silt to settle first and take your sample from the clear water at the top of the glass, the total recoverable and dissolved concentrations will be much closer to matching each other, if not nearly equal (within a few parts per billion of each other if sufficient time is allowed for settling). This is what the detention/retention basins will help to achieve. If the basins are well managed and incorporate natural vegetation, the last bit of fines from the sediment that take a long time to settle can be further filtered out or entrained by the vegetation, for example, further narrowing the difference between the total and dissolved concentrations in the water. A few parts per billion can make the difference between meeting or exceeding water quality standards for these contaminants of concern.

Additional mine waste removal within BPSOU will also have benefits to stormwater quality because stormwater contamination is primarily coming from buried mine wastes used as building materials all over the Butte Hill and the scouring of bank material. The Parrot Tailings area is generally too far upgradient (uphill) to intercept much stormwater relying on gravity flow, and the modeling that forms the basis of the TI waiver accounted for that. Most of the stormwater flow enters upper Silver Bow Creek at and below Harrison Avenue.

The Texas Avenue hydraulic dynamic device is one of five devices on the hill that initially take out the larger particles during a storm event. Investigations are currently underway through the West Side Soils Operable Unit remedial investigation to further our understanding of the nature and extent of contamination coming from this area, and the response actions for that area may further address contaminated stormwater originating from those areas. Even if that occurs, it does not eliminate the need for extensive stormwater controls within the BPSOU nor would it mean that the in-stream acute copper and zinc standards can be met.

Regarding natural mineralization, some naturally occurring mineralization occurs within the BPSOU in the form of naturally occurring outcrops or similar features that can add contaminants of concern to the overall BPSOU contamination. The amount of this contribution has not been quantified by EPA, and its presence was not a



significant factor in EPA and Montana DEQ's decision-making for the 2020 BPSOU Record of Decision Amendment.

## **2.35 Waste Removal**

### **2.35.1 Supports Proposed Plan**

#### **2.35.1.1 Comment Summary**

Six comments were received that expressed support for waste removal as described in the proposed plan.

- **Comment 5.3.** "Areas where groundwater contacts surface water throughout the upper Silver Bow Creek area is still a concern--I hope the EPA and DEQ will continue to work with local agencies to study the aquifer and explore new ways to capture and contain contaminated groundwater and keep it from entering the creek. I am grateful that the plan includes removal of tailings and other pollution in the Diggings East and Northside Tailings areas, as well as in the Blacktail Berm."
- **Comment 15.4.** "These two actions, along with additional removals near the stream banks in Blacktail Creek and at Butte Reduction works, should add even more to the load reduction during wet weather conditions, though how significantly, is still to be found out. Removal of streambed sediments in the vicinity of lower Blacktail Creek will also prove effective, as the likely source of pore water contaminants recently observed. By removing these materials, it can be actively monitored if the original source is in the streambed, or if it is re-contaminated by ground water, which has not been shown to be elevated in the concentrations needed to match the pore water concentrations."
- **Comment 22.4.** "2.1 CTEC supports the proposed waste removals of the Diggings East and Northside Tailings, Blacktail Creek, and Butte Reduction Works areas. Since the 2004 Proposed Plan, CTEC has advocated for the complete removal of all accessible mining waste in the Silver Bow Creek corridor. Recent data collected by EPA, ARCO, NRD, DEQ, MBMG, and Montana Tech shows the continued impacts of contaminated groundwater on surface water in the Silver Bow Creek watershed. Removal of mining waste will reduce the long-term threats to surface water from contaminated groundwater and reduce perpetual treatment requirements and costs. The result is a more permanent remedy which we support."



- **Comment 25.3.** “Waste Removal. TU supports removal of all accessible mining waste in the Silver Bow Creek corridor that could contribute to further groundwater or surface water contamination. The proposed waste removals at Diggings East, Northside Tailings, Blacktail Creek, and Butte Reduction Works will reduce the risk of on-going and future migration of metals contamination downstream and reduce long-term groundwater treatment costs. If there is a meaningful opportunity for restoration in the upper Silver Bow Creek corridor, it must start with effective waste removal and containment.”
- **Comment 30.4.** “Removing the mine wastes from the corridor. This is truly a good thing for Butte and the parties need to be commended for taking this action as opposed to leaving “waste in place”. The question now becomes, “how much will be removed both laterally and horizontally?” It has been stated in one of the EPA presentation meetings that some “600,000 bank cubic yards” will be removed in the corridor. The implication being that the entire area laterally will have waste removal operations. The proposed plan as presented states that the wastes will be removed down to an average high ground water level, i.e., no dewatering will take place. As it has been show that a majority of the contaminants are contained in an organic/silt layer below the wastes and as seen in the Parrott Phase I removal, this layer of silt most likely may lay below the ground water level. Thus, assurances are needed in the ROD amendment that MOST of the contaminates are removed both laterally and horizontally in the entire corridor area and not just those above an arbitrary ground water level or in a small area to provide for a storm water basin.

“In addition, I hope the EPA does not have blinders on or suffers from “not invented here” syndrome. As stated above, waste removals are already taking place in the corridor area at the Parrott tailings site. This is a learning experience and the process followed and the results attained should be incorporated in the clean up plans for the Northside Tailings, Diggings East, and the Blacktail Berm. We have lost access to our groundwater because of contamination due to mining activities. It is imperative that the ground water eventually be allowed to clean up and it will never happen if significant contaminants are left behind.”

- **Comment 52.2.** “Now, I will say this. I will compliment the work being done on the removal of the tailings. I'm proud to see that that



work has been done. I think it's excellent work. I think you're doing the right thing getting those toxins out.”

#### **2.35.1.2 EPA Response**

The comments received in support of waste removals as described in the proposed plan are noted for the record.

### **2.35.2 Other**

#### **2.35.2.1 Comment Summary**

Nineteen comments were received that generally supported the removal of the Diggings East, Northside Tailings, and Blacktail Creek berms (as part of the larger Blacktail Creek removal) and raised issues or suggestions about EPA’s prior and proposed mine waste removals. Issues raised were impacts to local traffic patterns, the need to focus on the Butte Hill for additional waste removal, the depth of excavation proposed for the Diggings East and Northside Tailings removals described in the proposed plan, the amount of cleanup that will be required in the floodplain areas of Blacktail Creek and Silver Bow Creek below its confluence with Blacktail Creek, and the buried mining wastes that are around the Silver Lake pipeline and Flintstone Creek. One commenter also emphasized the need to make the Silver Bow Creek area above its confluence with Blacktail Creek into a “meandering design” and to remove the BPSOU Subdrain as unnecessary after removal of contaminated groundwater by the State of Montana.

- **Comment 7.5.** “C Tailings Removals. With Parrot Tailings and groundwater removed by the State of Montana, Butte hydrologists have expressed that the creek could repair itself to a natural stream far, far sooner than geologic time IF only EPA will require removal of ALL accessible tailings from Northside, Diggings East and Blacktail berm. Please return the old creek channel to a meandering design. ARCO voluntarily straightened the original creek channel in a failed effort that EPA accepted anyway. It is an eyesore that never received the promised beautification. Please require that channel be contoured back into a natural shape to anticipate the day when it will again carry all the East Ridge water to the confluence with Blacktail Creek. To accomplish this, please require removal of:

1. ALL tailings in the corridor are removed – not just those above the high groundwater table. This will allow the inefficient French Drain that ARCO voluntarily placed as an experiment to be removed along with the tailings around it. Please require the



dogleg ditch they created be contoured for a meandering stream. With AR's legacy of toxic tailings removed, the argument that clean water "will harm the remedy" is not valid. The ROD Amendment must show a continuous flowing creek uninterrupted by infrastructure.

2. Newly found tailings: During excavation for stormwater ponds, please require at least any obvious mine or smelter waste uncovered be removed regardless of depth.
  3. Tailings from Texas Avenue to Civic Center including Flintstone Park tailings must be removed.
  4. Tailings surrounding Silver Lake Pipeline must be removed.
  5. French Drain Tailings. The slotted-hole pipe buried only 5' below surface is not adequate to collect groundwater contamination from throughout the wide corridor! Please order the pipe be removed. When a greater amount of stormwater is captured in Butte and sent to the Mine Flooding O/U or directly to the Lagoons for treatment, and all accessible tailings are removed, there is lessened need for stormwater basins that use most of the space in the corridor under the Proposed Plan Amendment.
  6. Slag Walls at Montana Street contribute not just mining contaminants but petrochemical organics to Silver Bow Creek. They must be moved out of water's way. In the 1990's ARCO discovered Historic Preservation laws were handy to decrease the amount of cleanup required on the Butte Hill; however, when the "historic mining landscapes" posed serious human health concerns, they were legally replaced by signage that depicted what used to be there. I suggest this approach be used for the slag walls. A large piece of the walls could be moved to a place like the Mining Museum for visitors edification, yet out of water's way. For human health and the environment these walls must come tumbling down and the tailings and organics beneath must be removed to a safe repository."
- **Comment 11.1.** "I'm writing to comment on the proposed remedy for the BPSOU in Butte. My focus is the Diggins East and Northside Tailings area and how it affects the surrounding neighborhood both currently and in the future. Currently, George St. runs thorough the Diggins East. In this section, the road is as wide as a state highway



and drivers use the road for east-west, crosstown traffic. Due to the size of the road through this section, drivers go very fast. Immediately to the east of the Diggins East, George Street is directed into a narrow alley, inches away from homes, and with multiple stop signs. To the east of this section (alley-wide), George St. turns back into a normal sized neighborhood street. Thus, creating a very dangerous bottleneck through the alley-wide section.

“Currently and in the past, many properties have been hit by vehicles. My house, and everything in my back yard was violently hit by a vehicle on a Sunday afternoon. The house directly across the street was hit violently two weeks prior. Luckily that house was vacant at the time. Additionally, most of the properties on the alley-wide stretch have had vehicle collisions and most have built barricades to protect themselves. Due to the bottleneck, most drivers speed through the narrow stretch, and to maintain speed, they run all of the stop signs. I have set up cameras and have done multiple counts on total vehicle traffic as well as wrong-ways and run stop signs. About 350+ people use the ally-wide section a day. More than 200 run the stop signs! An average of 4 people drive the wrong way a day as well.

“The plan for the Diggins East which has been presented to the public shows a wonderful park with many amenities for children and the public. This will increase foot and vehicle traffic on the alley-wide section and will exacerbate the already dangerous current conditions. Likewise, the highway-like road going through the new park will create another hazard. Please, use this opportunity to fix these problems, not to make them worse! There was overwhelming public support for getting rid of or redirecting George St. at EVERY public workshop help on this topic. Please cut off cross-town traffic from speeding through the new park and through our neighborhood alley before someone is hurt or killed by this dysfunctional excuse for a street.”

- **Comment 31.8.** “6. Cleanup Activities that have occurred to Date. All areas, to date, that have been cleaned up have involved very minimal disruption of personal private property, commercial property, residential homes, and public roads. The majority of areas cleaned up is large areas of land and stream bed unoccupied by personal or commercial dwellings or developed real estate. Most of the areas cleaned up to this point have contained a minimal number of private properties and have low levels of regular, daily human usage. These



areas have required a very minimal amount of negotiations to achieve the necessary levels of acceptable cleanup. Parts and pieces of the Butte Hill, for example Missoula Gulch, have been reclaimed, covered and re-vegetated. Once again, it was an area that was largely unoccupied by residential or commercial units. Silver Bow Creek, The Clark Fork River, opportunity ponds are all areas with no residential homes and no commercial activity. All the while, the area with daily human activity, including dwelling units and businesses, is the area that contains the highest amount of exposed and covered mine waste that has not yet been removed. The Focus and Clean Up should be redirected at the Butte Hill.

“Demanding a restored creek, and another major park and playground at this time is a practical joke, and simply continuing to put the cart before the horse. If this town isn't cleaned up and restored, specifically the Butte Hill, there is not going to be a measurable population able and enthusiastic to live or relocate here. That, with the point in the future when Montana Resources has to close, will contribute to a loss of tax base necessary to maintain parks and open spaces. The solution to the problem is an amalgamated effort by individuals, corporations, and government entities. It is not an individual effort or an easy decision; there may be a loss of family homes, parks, and playgrounds. However, the end result will be a healthy community with an economic future that is contributing bright minds and profitable businesses to the economy.

“Hundreds of people have acknowledged publicly and privately that the most effective solution to eliminate the minerals and metals that are causing elevated detectable levels in homes, yards, creeks and waterways, is to completely excavate the Butte Hill within the areas defined. This includes exposed unreclaimed mine waste and insufficiently reclaimed mine waste, as well as mine wastes covered by roads, sidewalks, homes, and insufficient reclaimed caps that are eroding or have plant materials that have died as a result of improper establishment and care.

“Complete excavation would be defined as the total and complete excavation of mine waste in the defined area, identified in orange on APPENDIX A, and described by boundaries in section #2. The Mine waste would then be deposited in an agreeable location, sometimes referenced as the Alice pit or Berkeley pit, with modern and efficient large scale Mining, excavation and hauling equipment. Immediately



following excavation, work would begin to establish modern streets, sidewalks, curbs and gutters with known points of entry and exit to properly divert storm water. The end result would be developable and salable lots with utilities established. The initial stages of the project would be covered as a cost of cleanup and remediation, however, the long term would provide commercial and residential real estate opportunities with new, modern utilities and infrastructure.

“If done correctly the project can circumvent eminent domain requirements, and the saleable lots could, in and of themselves, provide gap funding, a profit, or at a minimum reduce the total cleanup costs. This might require more work and face to face contact with individual personal property owners. However, this plan is not stupid, lazy or careless. The alternative plan involving excavation and redevelopment is intelligent, requires diligence, and sets a standard of excellence for the future.

“The EPA proposed ROD Amendment for BPSOU is a perpetuation of stupid, lazy and careless planning. Accepting the amendments is an acknowledgment of the same. I have spent significant a time over the past 20 years to look over, watch, read and interpret the cleanup plans and action, which were solely for my own benefit and without pay. The staff of the EPA responsible to review, propose and make decisions is being compensated fairly for their time, and further consideration of a proper long-term plan is highly encouraged and appreciated. Anything less than a complete cleanup is, frankly, a mere avoidance of responsibility and a deceptive marketing ploy to refocus attention away from the problem. Leaving this project unfinished only perpetuates the problem into the future, until a new group of leaders, legislators, judges, and government officials can step forward to do what should have been done 30 years ago -start cleanup at the origin of the problem. By not acknowledging the source of the mine waste, and not cleaning up the Butte Hill, we are leaving the option of mine expansion into the area by currently the active mine, Montana Resources.”

- **Comment 68.6.** “I want to put on the record that we will greatly enhance the ability of all the parties to do this thing right with maximum flexibility if, from Kaw Street to Utah Street, that George Street, both permutations of it, are removed and create a bigger open area in there for the ponds and for everything else. So what are we going to find out when we start digging out the Diggings East or the



Northside Tailings. Well, we're not going to really know how bad it is because they're only going to go down so far, to the top of the high groundwater level. Okay. I don't particularly like that. But thank you for taking them out at all because it opens up some opportunity in that area that wouldn't otherwise be there.

“Thank you to the parties for agreeing, and particularly to ARCO for agreeing, to remove the tailings in the Northside Tailings and the Diggings East. If you had followed this all along, you know that decision was made a long time ago that EPA had agreed. The State disagreed. Some of us disagreed. But the EPA and ARCO had come to an agreement that human health and safety did not require the removal of those tailings.”

- **Comment 74.1.** “1. I am in support of removal of tailings in Diggings East and Northside Tailings, however removal should not stop at the high ground water level, if during the tailings removal there is obvious contamination below this level. Additional areas of contamination should be included in the removal whenever possible. ... 8. Tailings around the Silver Lake Pipeline must be removed in addition to the tailings at “Flintstone Park” east of the county shops.”
- **Comment 77.2.** “Additional areas of contamination should be included in the removal whenever possible. I am in support of removal of tailings in Diggings East and Northside Tailings, however removal should not stop at the high ground water level, if during the tailings removal there is obvious contamination below this level.”
- **Comment 79.2.** “1. Removal of the remaining tailings below the high ground water level at Diggins East and at Northside Tailings. Included should be any additional areas of contamination whenever it's possible.”
- **Comment 82.1.** “I am writing in support of several changes to the Record of Decision (ROD). I am in support of removal of tailings in Diggings East and Northside Tailings, however removal should not stop at the high ground water level, if during the tailings removal there is obvious contamination below this level. Additional areas of contamination should be included in the removal whenever possible.”
- **Comment 83.2.** “1. I applaud the decision to remove the contaminated tailings contained in Diggings East and Northside Tailings. This removal should make every effort to remove all the



contaminated tailings practicable and not stop at some arbitrary depth, e.g., the high ground water level.”

- **Comment 84.4.** “We must not settle for leaving tailings in place around the Silver Lake pipeline, east of the county shops, or anywhere.”
- **Comment 85.1.** “I am writing in support of several changes to the Record of Decision. I am in support of removal of tailings in Diggings East and Northside Tailings, however removal should not stop at the high ground water level, if during the tailings removal there is obvious contamination below this level. Additional areas of contamination should be included in the removal whenever possible.”
- **Comment 86.1.** “I am writing in support of several changes to the Record of Decision. I am in support of removal of tailings in Diggings East and Northside Tailings, however removal should not stop at the high ground water level, if during the tailings removal there is obvious contamination below this level. Additional areas of contamination should be included in the removal whenever possible.”
- **Comment 88.1.** “I support removal of the contaminated mine tailings and a restored creek in Butte’s Silver Bow Creek corridor from Texas Avenue to Montana Street. Please remove the toxic waste leaching into the groundwater in the floodplain to protect our children and our community.”
- **Comment 89.1.** “We support removal of the contaminated mine/smelter tailings and a restored creek in Butte’s historic Silver Bow Creek corridor from Texas Ave. to Montana St. The cleanup should be equal to the restoration work that has already been performed downstream. Cleanup must be equal to the level of remediation and restoration work already completed in Silver Bow Creek’s 26 mile stretch downstream to Warm Springs Ponds.”
- **Comment 90.1.** “I support the removal of the contaminated mine/smelter tailings & a restored crick in the Butte's historic Silver Bow Creek corridor from Texas Avenue to Montana Street. The cleanup should be equivalent or even better to the areas already restored downstream. ALL toxic waste should be removed! All of us need to be protected from the harmful tailings in this corridor! Here is another chance to show the people of Butte that you really, for real--- care!!!”



- **Comment 91.7.** “6. The proposed plan calls for removal of contaminants in the Diggings East, Northside Tailings, and Blacktail Berm areas. Will substantially all contaminants be removed or only the amount necessary to construct the passive treatment system? What is the plan if during the removal process more extensive tailings are discovered? Will these be removed or left in place?”
- **Comment 98.17.** “C. Page 4, First Full Paragraph. The Proposed Plan states: “Analysis of additional surface water, pore water, and nearstream solid media found that the 2006/2011 ROD remedy did not encompass certain areas immediately upstream of the current BPSOU boundary that are impacting surface water. This is one of the reasons for the expanded streambank, sediment, and floodplain waste removals that are included in the proposed modified remedy described in this proposed plan.” This paragraph suggests that the expanded removals of streambank, sediments, and floodplain materials is due to the presence of contaminated sources entirely upstream of the BPSOU that have caused contamination of surface water within BPSOU, which is an incorrect statement. AR requests that EPA clarify which upstream areas it is referring to in this paragraph and whether such sources are entirely upstream of the BPSOU boundary or are “upstream” areas within the BPSOU. Historic mine waste sources, if any, located in the Blacktail Creek drainage upstream of BPSOU are not within the projected scope of the BPSOU final remedy.”
- **Comment 100.2.** “1. Tailings Removal. We support removal of tailings in Diggings East and Northside Tailings. We encourage additional removal of tailings beyond what is currently planned in order to remove long-term threats to groundwater and surface water downstream. Tailings removal should not stop at the high ground water level, if during the tailings removal there is obvious contamination below this level.”
- **Comment 101.1.** “I am writing in support of several changes to the Record of Decision. I am in support of removal of the tailings in Diggings East and Northside Tailings. However, removal should not stop at the high ground water level, if during the tailings removal there is obvious contamination below this level. Additional areas of contamination should be included in the removal whenever possible.”



### **2.35.2.2 EPA Response**

The 2020 BPSOU Record of Decision Amendment also provides for extensive floodplain waste removals for Silver Bow Creek below its confluence with Blacktail Creek and in the Blacktail Creek area, including the Blacktail Berms. The reason for the expanded removals of streambank, sediment, and floodplain materials at Blacktail Creek and Silver Bow Creek below its confluence with Blacktail Creek, as outlined in the proposed plan and described more completely in this 2020 BPSOU Record of Decision Amendment, is to verify the protectiveness of the remedy. EPA acknowledges the commenters' support for these removals and the Diggings East and Northside Tailings removals. The 2006/2011 Record of Decision specified removals at the confluence of Silver Bow Creek and Blacktail Creek but not upstream along Blacktail Creek where the berm and wetland areas are located. The reference in the paragraph cited by commenter 98 is to the small area proposed for removal on the east bank of Grove Gulch in the vicinity of the mouth of Grove Gulch. This area was previously outside of the BPSOU boundary, but with the expanded BPSOU boundary that was proposed in the proposed plan and adopted in the amendment, it is now included within the BPSOU.

One commenter asserted that prior Superfund removal within the BPSOU occurred primarily on Atlantic Richfield- or Butte Silver Bow-owned property. The waste removals that have taken place under prior Superfund response actions within BPSOU and are planned under the 2020 BPSOU Record of Decision Amendment requirements were determined based on data gathering and relevant investigations, including surface water, groundwater, sediment, and pore water data and evaluation. Prior removals have occurred on privately owned property and on Atlantic Richfield- or Butte Silver Bow County-owned property. For example, the Alice Pit overburden was removed and placed in the Alice Pit and then revegetated, and this action was located on private property. Residential areas that are addressed under the RMAP occur on privately owned property. The removal of the Lower Area One wastes occurred primarily on publicly owned or Atlantic Richfield-owned property. The goal of the prior and proposed removals is to limit or prevent direct erosion of waste materials into the creeks and discharge of contaminated groundwater into sediments and surface water. There are many areas of mine waste within the BPSOU where capping and revegetation was determined to be the appropriate remedy. The goal of the BPSOU remedy was not to remove all known mine wastes within Butte Hill as this would amount to the



destruction of hundreds of homes and businesses as part of such an action and would be infeasible.

Some mine waste is located under or near infrastructure such as the Silver Lake Pipeline, buildings, and railroads, making removal infeasible because of the risk of damaging these important infrastructure and established constructs. In cases where the tailings are not an active source of the loading to surface water, the decision was made to leave some tailings in place within specific areas that are difficult to access. Remedial programs like the BRES system to monitor and repair capped and vegetated areas and institutional controls that required deed restrictions limiting inappropriate use of capped areas are required under Superfund to continue to protect areas where waste is left in place. The BRES program also can be used to evaluate the area the commenter refers to as Flintstone Park, and remediation of that area can occur under that program.

EPA acknowledges the support for the removal of the Diggings East and Northside Tailings mine wastes that are not saturated with groundwater and the expanded full floodplain removals (both saturated by groundwater and unsaturated) of Blacktail Creek within the BPSOU and Silver Bow Creek from its confluence with Blacktail Creek, which will include full removal of the Blacktail berms. The waste removal actions in these areas will be substantially similar to the removal actions of the floodplain of Silver Bow Creek downstream from the BPSOU boundary within the Streamside Tailings Operable Unit that Montana DEQ previously implemented. Removal of the slag walls in the Butte Reduction Works area is not necessary as Silver Bow Creek in this area will be relocated to the south away from the slag walls and located in a remediated floodplain and will be protected from contaminated groundwater discharge by the expanded contaminated groundwater interception system. The commenter is correct to note that the slag walls are a protected resource under the National Historic Preservation Act and would need offset activities for their removal.

The removal depth of the Diggings East and Northside Tailings (to an elevation where the highest potentiometric surface has been observed over the most recent 3-year monitoring period) is a change to the 2006/2011 Record of Decision where that waste was to remain in place. Based on community and state input, EPA and other stakeholders decided to require removal of the groundwater unsaturated waste in these areas. The stormwater basins that will be installed in these areas will be lined,



which will prevent infiltration of contaminated stormwater into the aquifer in these areas. The removal of the mine wastes above the water table will eliminate a significant amount of source material in these two areas and will allow for the construction of the necessary stormwater retention/detention basins in these areas. The BPSOU contaminated groundwater containment and treatment system will be expanded and will intercept contaminated groundwater anywhere within the BPSOU where it is adversely impacting surface water quality or in-stream sediments from the various sources that will be left in place within BPSOU, including the saturated waste beneath the Diggings East and Northside Tailings areas.

Removal of the BPSOU Subdrain would result in the release of mine waste-contaminated groundwater into Blacktail Creek and Silver Bow Creek above and below its confluence with Blacktail Creek. The subdrain has proven to be effective in capturing some contaminated groundwater from the BPSOU alluvial aquifer for treatment that would otherwise discharge to Silver Bow Creek above and below its confluence with Blacktail Creek. The groundwater interception system will be improved and greatly expanded under the 2020 BPSOU Record of Decision Amendment such that all the necessary contaminated groundwater will be captured and treated so that it no longer adversely impacts the surface water or sediments of Blacktail Creek and Silver Bow Creek. The State of Montana's Parrot Tailings Waste Removal Project will remove all wastes in that highly contaminated site as defined in the state's amended Butte Area One Restoration Plan. Currently, the state's interim contaminated groundwater capture and treatment system of the Parrot groundwater is a welcome addition. See Section 2.31 Subdrain regarding the effectiveness of the BPSOU Subdrain capture system.

EPA will raise the issue of traffic impact (Comment 11) with Butte Silver Bow County authorities, who have the authority to change and enforce local speed limits and traffic laws, and other foot and vehicle traffic issues. Finally, the end land use plan released by Atlantic Richfield in May 2019, and which will be implemented in the corridor described in one commenter's comment, will be returned under that plan to a more natural and aesthetically pleasing state similar to a setting that could host a new, lined, meandering creek if the community later decides to create a creek in this area.



## 2.36 Water Quality District

### 2.36.1 Comment Summary

One comment received included a request for information about what the final Butte Water Quality District and its controlled groundwater area terms and conditions would be. The Butte Water Quality District is part of the institutional controls required for the BPSOU. The comment was submitted by Butte Silver Bow County.

- **Comment 96.7.** “5) Water Quality District. The Proposed Plan does not appear to address final directives on how the Water Quality District, and more precisely, Controlled Ground Water Areas will be regulated in the long term. For example, will directions to sample and monitor private irrigation wells be required in perpetuity? Other considerations requiring resolution under the CD includes a) frequency of testing (e.g., every five years for 30 years?); b) geographic Boundary of Test/Sample area (i.e., Groundwater TI Zone?); and c) abatement requirements (e.g., mandated hook-up to municipal water, payment of fees at average customer consumption until property is transferred, etc.).”

### 2.36.2 EPA Response

Groundwater in and around Butte, Montana, has been contaminated by over a century of mining, milling, smelting, and other mining-related activities. The extent and dispersed nature of groundwater contamination have rendered portions of the alluvial aquifer (which is part of the BPSOU) and the bedrock aquifer (which is part of the Mine Flooding Operable Unit) technically impracticable to clean up such that state and federal drinking water standards could be achieved. A TI waiver was granted for those portions of the aquifers in the 2006/2011 BPSOU Record of Decision and the 1994 Mine Flooding Operable Unit Record of Decision. The State of Montana did not agree with EPA’s TI evaluation and its waiver of groundwater standards in the 2006/2011 BPSOU Record of Decision but is now in agreement with the 2020 BPSOU Record of Decision Amendment if the proposed consent decree is entered.

In 2009, at the request of Butte Silver Bow County, the Montana Department of Natural Resources and Conservation issued the Butte Alluvial and Bedrock Controlled Groundwater Area (BABCGA) petition for the area potentially impacted by mining-related activities in and around Butte, Montana. The terms of the BABCGA must be followed in the manner described in the petition ruling and will discontinue only when



an application is made to and approved by the department to terminate the petition. The BABCGA was designed to address groundwater associated with the Butte Mine Flooding Operable Unit, BPSOU, and the nearby Montana Pole Superfund site by prohibiting new domestic wells and requiring additional monitoring and abandonment of existing wells under certain conditions. The BABCGA is implemented by the Butte Water Quality District, and its implementation is funded by Atlantic Richfield.

The BABCGA identified numerous private wells installed within its boundary that include those used for domestic (potable water), irrigation, industrial, and monitoring. New domestic water wells have been prohibited in Butte since 1992 for residences within 300 feet of a municipal water line; however, other types of well installation for irrigation, industrial, and monitoring are allowed following certain conditions. New, non-domestic groundwater wells are only allowed within the area after review and approval by the Butte-Silver Bow Board of Health (acting as the Butte Silver Bow Water Quality District office), EPA, and Montana DEQ. Monitoring wells are excluded from these provisions while potable, irrigation, and industrial wells are regulated according to their use and the data that are provided when these wells are monitored.

A monitoring program has been instituted for private wells within the BABCGA. The Montana Bureau of Mining and Geology conducts the monitoring within the BABCGA. Remaining domestic wells meeting water quality standards, which allow for domestic use, are sampled every year. Industrial or irrigation wells meeting water quality standards specific to the industrial or irrigation use are sampled every 5 years. The data gathered from the sampling of Butte area private wells quantify the concentrations of total metals from domestic wells and dissolved metals in the groundwater from industrial and irrigation wells. Domestic wells with contaminants of concern concentrations that exceed the drinking water standards will be resampled with samples collected for both total and dissolved metals. If the confirmation samples also exceed the drinking water standards, an alternative drinking water source will be provided to the property. Industrial or irrigation wells exceeding drinking water standards must comply with the use exemption provided in the *Final Order Petition for Butte Alluvial and Bedrock Controlled Ground Water Area No. 76G-30043832* (DNRC 2008) and their use must not be detrimental to human health or the environment.



EPA and Montana DEQ will continue to work with Butte Silver Bow County to provide additional clarity regarding the BABCGA, if necessary, during remedial design for implementation of the BPSOU and Mine Flooding Operable Unit remedies. The 1994 Mine Flooding Operable Unit Record of Decision and the 2006 BPSOU Record of Decision direct the implementation of this institutional control, among others, and further detail is not necessary in the 2020 BPSOU Record of Decision Amendment.

### 3.0 REFERENCES

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EPA. 2019a BPSOU Surface Water Compliance Determination Plan, *Butte Priority Soils Operable Unit of the Silver Bow Creek / Butte Area Superfund Site, Attachment A to the BPSOU Remedial Design/Remedial Action Scope of Work (Appendix D to the Consent Decree)*. October 2019. U.S. Environmental Protection Agency.

EPA. 2019b. BPSOU Surface Water Management Plan, *Butte Priority Soils Operable Unit of the Silver Bow Creek / Butte Area Superfund Site, Exhibit A to Attachment A to the BPSOU Remedial Design/Remedial Action Scope of Work (Appendix D to the Consent Decree)*. October 2019. U.S. Environmental Protection Agency.

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**ADMINISTRATIVE RECORD**

# **Explanation of Significant Differences to the 2006 Butte Priority Soils Operable Unit Record of Decision**

July 2011

## **Section 1**

### **Introduction**

#### **1.1 Site Name and Location**

This document presents an Explanation of Significant Differences (ESD) from the 2006 Record of Decision (ROD) for the Butte Priority Soils Operable Unit (BPSOU) of the Silver Bow Creek/Butte Area National Priorities List (NPL) site (Site).

The Site, which includes the Butte Priority Soils Operable Unit (BPSOU), is one of four contiguous Superfund sites in the upper Clark Fork River Basin that extend 140 miles from the headwaters of Silver Bow Creek north of Butte to the former Milltown Reservoir near Missoula, Montana (Figure 1-1). The Site lies immediately west of the Continental Divide in southwestern Montana, at the easternmost extent of the upper Clark Fork River drainage. The Site encompasses approximately 85 square miles, including the entire length of Silver Bow Creek and associated land contamination from Butte westward approximately 25 miles to the Warm Springs Ponds near Anaconda. The Site incorporates several square miles of land area within the City of Butte, Montana.

The BPSOU consists of a 5 square mile area encompassing the Town of Walkerville and a large portion of the City of Butte, as shown in Figure 1-2, as well as associated alluvial aquifer contamination. The operable unit (OU) is centered on Butte Hill, which is the location of the historic Butte Mining District. Silver Bow Creek flows along the base of Butte Hill. The OU is situated in a predominately urban setting and includes residential neighborhoods, schools and parks, and commercial and industrial areas.

The ROD for the BPSOU was signed by the U.S. Environmental Protection Agency (EPA), with partial concurrence from Montana Department of Environmental Quality (DEQ) in September 2006 (EPA 2006). The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) identification number is MTD 980502777.

#### **1.2 Statement of Purpose**

Following the signing of the ROD in September 2006, information generated during remedial design prompted reassessment of portions of the Selected Remedy for solid media (mine waste, soil, and residential soil and dust) and alluvial groundwater. Even though the changes are significant, they do not involve fundamental change with respect to the scope, performance, and/or cost of the Selected Remedy described in the BPSOU ROD.



The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended, provides for the public disclosure of the reasons for significant differences through this document. The pertinent section of CERCLA, Section 117(c), requires the lead agency to address post-ROD significant changes in the following instances:

*After adoption of a final remedial action plan (1) if any remedial action is taken [under section 104 or 120]; (2) if any enforcement action under section 106 is taken; or (3) if any settlement or consent decree under section 106 or section 122 is entered into, and if such action, settlement or decree differs in any significant respects from the final plan [the ROD] the [lead agency] shall publish an explanation of significant differences and the reasons such changes were made.*

Section 435(c)(2) of the National Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) §300.435(c)(2), states the same criteria and direction. EPA's remedy selection guidance entitled "A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents", Office of Solid Waste and Emergency Response Dir. No. 9200.1-23P (EPA 1999), further explains the nature of significant differences and states that considering the change in the remedy's scope, cost, and performance is a site-specific determination. According to the guidance, significant differences generally involve a change to a component of a remedy that does not fundamentally alter the overall cleanup approach.

In this case, the changes identified below are significant differences that do not change the fundamental overall cleanup approach. Some of the changes may be considered minor modifications to the BPSOU ROD, but EPA has included them in this document to provide full public disclosure and consistency with the NCP. Details of these changes, including the basis for these decisions, are provided in Section 3.

#### **Selected Remedy for Solid Media: Residential Metals Abatement Program (RMAP)**

1. The modification of the residential assessment and sampling time period from 8 to 10 years, and the modification of the remediation time frame for residential areas found to exceed action levels from 15 to 20 years (Pages 12-2, 12-15, and 12-16 of the ROD). Yearly goals and yearly reporting for achieving yearly goals are also identified.
2. The modification of the soil sampling depth for residential areas from the original 0 to 2 inches to depths of 0 to 2 inches, 2 to 6 inches, and 6 to 12 inches (Page 12-20 of the ROD).
3. The modification of the contaminated soil removal and replacement depth from yard areas from 18 inches to a minimum of 12 inches (Page 12-20 of the ROD).

#### **Selected Remedy for Solid Media: Non-Residential Contamination**

4. The elimination of the need for reclamation of the small waste area at the Wake-Up Jim site 1615 because the site is now protected under the Granite Mountain Memorial historic site and its fencing and institutional control requirements (Page 12-24 of the ROD).



### **Selected Remedy for Groundwater: Groundwater Monitoring**

5. The elimination of the need for tracer dye monitoring of the Metro Storm Drain (MSD) Sub-Drain system and replacement with augmented flow monitoring (Page 12-39 of the ROD).

### **1.3 Document Availability**

The ESD and all documents that support the changes are part of the administrative record for the BPSOU as required by NCP Section 300.825(a)(2) and are also located in local information repositories in Butte, Montana.

The full administrative record is housed at the following address:

U.S. EPA  
Montana Office  
10 W. 15th St, Suite 3200  
Helena, Montana 59626  
Hours: Monday through Friday 8:00 am to 4:30 pm, except holidays.

Local information repositories include Citizen's Technical Environmental Committee (CTEC) and the Montana Tech Library. Their address and business hours are as follows:

CTEC  
27 W Park St  
Butte, Montana 59701  
Hours: Monday through Thursday from 10:00 am to 3:00 pm.

Montana Tech Library  
1301 W Park  
Butte, Montana 59701  
Summer Session Hours: Monday through Friday 7:30 am to 4 pm.  
All other session Hours: Monday through Friday 7:30 am to 10:00 pm  
Sunday 1:00 pm to 9:00 pm  
Saturday Noon to 5:00 pm

## **Section 2**

### **Site History, Contamination, and Selected Remedy**

A complete description of the BPSOU, its history, the contamination and its threat to human health and the environment, as well as the Selected Remedy provided for in the 2006 BPSOU ROD, can be found in the *Record of Decision Butte Priority Soils Operable Unit Silver Bow Creek/Butte Area NPL Site, September 2006* (EPA 2006), Declaration and Decision Section, Parts 1 and 2.



## **2.1 Silver Bow Creek/Butte NPL Site**

The following presents important Site events and relevant dates for the Site. The identified events are illustrative, not comprehensive.

- 1864 – First placer gold claims in the Butte area were staked and worked. However, silver and copper ore also drew attention of early miners.
- 1870 – Dozens of silver and copper claims had been located and developed, prompting construction of mills and smelters capable of refining arsenic-laden copper ores.
- 1881 – Copper baron Marcus Daly marked a significant turning point for Butte by rapidly acquiring surrounding mining properties on the Butte Hill. At about this time, there were over 300 operating copper mines, at least 10 silver mines, 5 smelters, and over 4,000 posted claims. Many mining companies operated in the Butte area from the 1860s through the 1920s.
- 1890 – In response to poor air quality for many years, the city of Butte passed ordinance 186, which made it illegal to roast ore with the city limits.
- 1910 – Butte had become the largest producer of copper in North America and large quantities of mine waste and tailings were disposed of in ponds or dumped in Silver Bow Creek. A series of consolidations and mergers resulted in almost all facilities in Butte being operated and owned by the Anaconda Copper Mining Company.
- 1920s – Milling and smelting continued in Butte; however, as the copper smelting capacity at Anaconda grew, Butte became primarily a mining center. Butte's smelters and mills produced air emissions that contaminated yards and attics throughout the BPSOU, as well as large quantities of waste such as tailings and slag. Butte's mines also produced waste and overburden piles throughout Walkerville and Butte.
- 1955 – Open pit mining began in Butte with the formation of the Berkeley Pit. Previously, all mining in Butte was completed entirely underground.
- 1964 – The completion of the Weed Concentrator (now known as the Montana Resources Concentrator) reduced the amount of ore sent to Anaconda; however, the concentrator also led to production of large quantities of waste in the active mining area and discharged large volumes of contaminated water to the Metro Storm Drain area.
- 1977 – ARCO merged with Anaconda Copper Mining Company (ACMC). Open pit mining operations were conducted in the Berkeley Pit until 1982 and in the Continental Pit until 1983 when all mining operations were suspended by ARCO, the successor to ACMC.
- 1984 – ARCO closed the Anaconda Smelter. Later, ARCO, now known as the Atlantic Richfield Company, became a wholly owned subsidiary of the BP collection of companies.



***Regulatory Enforcement:***

- 1983 – EPA designated the original Silver Bow Creek as a Superfund site in September 1983.
- 1987 – Recognizing the importance of Butte as a source of contamination to Silver Bow Creek, EPA concluded that Butte and Silver Bow Creek should be treated as one site under CERCLA. EPA subsequently modified the existing Silver Bow Creek site to include the Butte area and the formal name changed to the “Silver Bow Creek/Butte Area NPL Site.” The BPSOU was one of four remedial OUs formed in the Butte Area.
- 1989 – EPA separated the BPSOU into Phase I and Phase II. Phase I activities focused on high-priority human health risks and resulted in the implementation of numerous time-critical removal actions (TCRAs) and emergency response actions (ERAs) (summarized in the section below). Phase II activities included conducting the full remedial investigation (RI)/feasibility study (FS) for the entire OU.
- 1991 – EPA developed the statement of work (SOW) for the Phase II RI/FS. The SOW served as the substantive basis for the Phase II RI/FS work plan. A consent order to conduct a RI/FS at the BPSOU was executed by EPA and signed by ARCO and other BPSOU potential responsible party’s (PRPs) in June 1992.

**2.2 Butte Priority Soils Operable Unit**

The RI/FS for the BPSOU was conducted by the BPSOU Potential Responsible Party Group. The final RI report was issued in April 2002 (PRP Group 2002) and the final FS was issued in April 2004. EPA released the proposed plan in December 2004 (PRP Group 2004) and the ROD was completed in September 2006 (EPA 2006).

During the course of the RI/FS, EPA implemented several response actions to address high priority human health risks and reduce the severity of contaminant loading to Silver Bow Creek and to protect downstream remedies at other OUs (i.e., Stream Side Tailings Operable Unit [SSTOU] and Warm Springs Ponds Operable Units [WSPous]). Response actions done to date have addressed over 8 million cubic yards of waste within the BPSOU using removal, capping, and/or land reclamation. Over 400 acres of mine-impacted land on the Butte Hill have been reclaimed. Also, approximately 1.2 million cubic yards of tailings that were previously in contact with groundwater and surface water have been removed from the Silver Bow Creek floodplain, and stormwater controls, including conveyance channels, diversions, and detention basins have been constructed to reduce contaminant loading carried from the Butte Hill via stormwater runoff.

Despite the past response actions completed at the BPSOU, remedial goals have yet to be achieved and significant risks still threaten human and environmental receptors. The potential exposure to lead and arsenic in residential soil and interior dust continues to pose a significant human health risk. Arsenic and metal contaminants in surface water and alluvial groundwater exceed applicable water quality standards and continue to affect aquatic life in Silver Bow Creek.



The list below provides a brief summary of the removal actions performed at the BPSOU.

**Removal Actions:**

- 1988 - Walkerville (north of Butte): Stabilization of 300,000 cubic yards of lead-contaminated soil from mine waste dumps. Four earthen basements and 23 residential yards were cleaned up.
- 1989 - Timber Butte: Some 40,000 cubic yards of contaminated soil were moved to a temporary onsite repository in 1989. Two residential yards were cleaned up.
- 1990-1991 - Priority Soils: Waste dumps containing about 100,000 cubic yards of soil were either capped or removed. A railroad bed and seven residential yards were also reclaimed.
- 1991 - Colorado Smelter: Approximately 40,000 cubic yards were moved to an onsite disposal area.
- 1992 - Anselmo Mine Yard/Late Acquisition Silver Hill: contaminated soils were removed.
- 1994 - Walkerville: Several waste dumps were either removed or capped.
- 1994 - Residential/source areas: Residential yards and waste rock dumps located throughout Butte and Walkerville have been/are being addressed.
- 1996 - Stormwater: Construction of cement channels and sedimentation ponds throughout the Butte hill to address stormwater contamination.
- 1999 - Railroad: Removal of contaminated soil on numerous railroad beds and rail yards throughout the Butte hills.
- 2000/2001 - Walkerville residential area: This action addressed 46 residential properties throughout Walkerville, Montana.

## 2.3 Selected Remedy

The Selected Remedy for the BPSOU includes components to address contaminated solid media (mine waste, soil, and residential soil and dust), specific land use areas such as the Granite Mountain Memorial Interpretive Area and the Syndicate Pit, surface water (base flow and stormwater runoff), and alluvial groundwater. A short description of the Selected Remedy, as originally presented in the *Record of Decision Butte Priority Soil Operable Unit Silver Bow Creek/Butte Area NPL Site, September 2006 (EPA 2006)*, is presented in the subsections below for solid media, groundwater, and surface water. A detailed description is also provided in section 12 of the BPSOU ROD.

### 2.3.1 Residential Contamination

EPA's action levels for residential, commercial/ industrial, and recreational soils and dust are:

**Table 2-1**  
**Soil, Dust, and Vapor Action Levels in Residential Areas**



Contaminant of Concern (COC)	Exposure Scenario	Concentration
Lead	Residential	1,200 milligrams per kilogram (mg/kg)
	Non-residential	2,300 mg/kg
Arsenic	Residential	250 mg/kg
	Commercial	500 mg/kg
	Recreational	1,000 mg/kg
Mercury	Residential	147 mg/kg
	Residential (vapor)	0.43 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ )

The Selected Remedy requires yards, residential areas, recreational areas, and industrial/business areas above these action levels (as well as indoor dust and attic dust in living spaces if a pathway of exposure of exposure exists), to be remediated.

Certain residential areas above these levels have been addressed previously under prior removal actions, but many homes and residences have not. The yard/recreational/business location and indoor dust cleanup apply throughout the BPSOU, and the attic dust portion applies throughout the BPSOU and to an area adjacent to the BPSOU (See Appendix A BPSOU and Butte Site Map).

The Selected Remedy calls for the continuation and expansion of the BSB Lead Intervention and Abatement Program to achieve these requirements. The expansion of this program in the Selected Remedy requires that all residential properties within the BPSOU must be sampled, assessed, and abated if action levels are exceeded, within a reasonable time frame, for arsenic, lead, and mercury. Abatement includes cleaning up yard soils, indoor dust, and attic dust as described below. Abatement can be done through the existing program, and can be integrated with the comprehensive abatement components of the existing program, which are already established.

If the Superfund remedial requirements are incorporated into the existing and expanded comprehensive program, complete indoor and outdoor assessment (i.e., residential yard soil, indoor and outdoor dust, non-living space dust, lead-based paint, drinking water, and mercury vapor) of all residential properties that are known to be occupied or expected to be occupied must be completed within 8 years of the initiation of the expanded program. During this 8-year period, the cleanup of residential properties that exceed the action levels will occur in concert with the assessment program. The Selected Remedy requires the assessment and abatement activities be completed in no later than 15 years. This program will be a point of focus during the 5-year review process to determine if changes need to be made to improve the program.

Contaminated dust in portions of homes that are seldom visited (non-living space areas), such as attics or crawl spaces, will be abated if an exposure pathway is identified during sampling



and evaluation of the home. If elevated concentrations of heavy metals are found in the attic dust, and there is no avenue for the dust to migrate into the living space, the attic dust will not be removed. Homes where remodeling is planned that would create an exposure pathway to attic dust will be abated. If sampling of living space identifies a pathway of exposure created in other ways, then these homes will also be abated.

Properties that are not addressed or abated because the owner would not allow access for sampling, properties with contaminated attics that are not abated because there is no current exposure pathway, and properties that are not currently occupied will be flagged and tracked in a database for future action. These properties will be tracked for at least 99 years.

Community awareness and educational programs in conjunction with a medical monitoring program are also required.

### **2.3.2 Non-Residential Solid Media and the Butte Reclamation Evaluation System**

Contaminated solid media in non-residential areas at the BPSOU include waste rock piles, smelter wastes, milling wastes, and contaminated soils. Solid media in non-residential areas including commercial areas, open areas, and non-active mining areas may exceed action levels. These areas may also pose a threat to the environment from stormwater runoff. For example, runoff from these areas is a source of copper and zinc loading to receiving waters. Contaminated solid media shall be addressed through a combination of source removal, capping, and land reclamation.

All contaminated solid media within the BPSOU containing concentrations of arsenic, lead, or mercury above the respective action levels shall be addressed. Also, source areas that do not exceed action levels shall be addressed if diagnostic monitoring performed as part of the surface water management and best management practices (BMPs) program indicates that the source area contributes contaminant loads to receiving surface waters during wet weather runoff conditions.

The Butte Reclamation Evaluation System (BRES) (see 2006 BPSOU ROD Appendix E) establishes the vegetation, weed, and erosion performance standard for all completed solid media response actions under the Selected Remedy. The system is specifically designed for use in the upland environment of Butte. To accommodate the diverse land types and end land uses within the BPSOU, the BRES is designed to address reclaimed uplands in residential, recreational, and commercial/industrial land settings, excluding: residential yards, and playgrounds. The system also has components that allow it to be applied to areas reclaimed as open space within this urban setting. Reclaimed areas, including cover soil caps, must achieve the performance standards described by EPA in the BRES document. This system is a tool created for the BPSOU to evaluate the site-specific stability, integrity, and degree of human and environmental protectiveness afforded by response actions initiated on lands impacted by mining within the Butte site, as well as a tool to create and implement corrective action work plans for each area on a periodic basis.

The BRES is an evaluation tool for reclaimed and revegetated land, relying on routine inspections to assess the following:

- Condition and diversity of vegetative cover
- Presence of erosion



- Condition of site edges
- Presence of exposed waste material
- Presence of bulk soil failure or mass instability
- Presence of barren areas or gullies

The system also sets corrective action “triggers”, coordinated with the conditions listed above. Based on the periodic monitoring and evaluation of response action sites, the triggers noted in the BRES require corrective action in a timely and appropriate manner in accordance with the scheduling requirements of the BRES. Vegetated cover soil caps must support a diverse plant community including native species to the extent that the constituents of the vegetation cover are not incompatible with the Selected Remedy.

### **2.3.3 Groundwater**

The ground water component of the Selected Remedy requires the continued use of the Hydraulic Control Channel (HCC) and the Metro Storm Drain capture and interception system (MSD) to capture and pump contaminated ground water (and some surface water) into the Butte Treatment Lagoon facility for treatment prior to discharge. Both the HCC and the MSD are to be thoroughly evaluated and improved as needed. Waste left in place will not be excavated. Additional ground water control measures, such as infiltration barriers, ground water diversion, or other measures, may also be needed and are to be evaluated. The ground water aquifer must be further evaluated and characterized to ensure the effectiveness of the interception and pumping systems. Ground water monitoring and data reporting is required. The wetlands demonstration area near Kaw Avenue and George Street will be used for the construction of an emergency over flow pond (this is a minor modification to the 2006 ROD which listed the area as a possible catch basin area). A five year shakedown period for operation of the MSD interception and pumping facility is required. Institutional controls to prevent domestic use of the alluvial aquifer are required.

The Selected Remedy requires the capture and treatment of contaminated groundwater. The 2006 BPSOU ROD contained a waiver of ARAR standards for the alluvial ground water within the defined TI Waiver Area described in the 2006 BPSOU ROD. The Selected Remedy will not and is not intended to clean up groundwater to meet groundwater performance standards within the boundary of the waived standards. Therefore, there are no performance standards for groundwater in the area of the BPSOU alluvial aquifer that is covered by the TI waiver boundary. The TI boundary is shown in Figure 12-6 of the 2006 BPSOU ROD. Based on the data collected during the groundwater monitoring program, additional points of compliance may be determined necessary by EPA in consultation with DEQ in future remedial design (e.g., southern edge of the MSD).

Since the Selected Remedy requires that contaminated plumes be prevented from migrating outside the established TI zone, the boundary for the TI zone represents the point of compliance boundary for groundwater, and groundwater performance standards must be met at these points of compliance and beyond, as further defined in the Revised Interim Ground Water Monitoring Plan (EPA 2011). Groundwater quality standards (Appendix B, Table 2) will apply to groundwater at and beyond the edge of this boundary.



Groundwater contamination outside of the boundary of the TI zone in excess of groundwater performance standards identified in Appendix B, Table 2 shall constitute a violation.

Design of a groundwater treatment system at the Butte Treatment Lagoons facility and a sludge disposal plan must be approved by EPA, in consultation with DEQ, and the construction, operation, and maintenance of the facility will be monitored by EPA and DEQ in accordance with approved plans. The facility will be designed so that any discharge from the facility must meet water quality ARARs described in Appendix B and in the ARARs established in the 2006 BPSOU ROD. Design, construction, maintenance, operation, and monitoring of the facility will be conducted according to the engineering standards established during remedial design and ARARs, and must be approved by EPA in consultation with the State. Treated water discharged to Silver Bow Creek shall meet all discharge requirements set forth in the ARARs (Appendix B and the ARARs established in the 2006 BPSOU ROD). This discharge to surface water is discussed in greater detail in the following section.

#### **2.3.4 Surface Water**

In addition to the robust implementation of the ground water remedial component described above to prevent contamination from ground water and certain captured surface water from contributing to exceedances of surface water Performance Standards, the 2006 BPSOU ROD requires the removal of in-stream sediments and near stream contamination in the reach of Silver Bow Creek and certain areas of Blacktail Creek which were not addressed in the prior Lower Area One non-time critical removal action. It also requires that the discharge from the Butte Treatment Lagoons facility meet Performance Standards for discharges in a permanent manner.

For wet weather conditions, the Selected Remedy requires the remediation of several specifically identified sites which are known to contribute to contaminated storm water runoff (these actions are described in the 2006 BPSOU ROD as part of the solid media component of the Remedy). The evaluation and implementation of BMPs on a yearly basis to control wet weather run-off under a variety of scenarios and flows such that surface water Performance Standards are met is also required. If BMPs do not meet surface water Performance Standards within a fifteen year time period, the 2006 BPSOU ROD provides for contingency measures such as the construction of a collection and treatment plant system for stormwater and/or flow augmentation in Silver Bow Creek.

The overall remedial goal for the ROD as applied to Silver Bow Creek is to achieve and maintain the in-stream concentration of site-specific COCs (aluminum, arsenic, cadmium, copper, iron, lead, mercury, silver and zinc) below the numeric surface water quality standards identified in the ARARs, ROD Appendix B Table 3, for all flow conditions throughout the length of Blacktail Creek, Grove Gulch Creek, and Silver Bow Creek within and directly downstream of the BPSOU.

The Selected Remedy requires an EPA-approved comprehensive, long-term surface water monitoring program that will include collection of compliance and diagnostic flow and chemistry data for normal flow and wet weather conditions in receiving surface waters and within intermittent storm water conveyances at the BPSOU.

#### **2.3.5 Groundwater Treatment Facility**

As previously described, the Butte Treatment Lagoon facility shall be evaluated and designed to ensure that contaminated groundwater captured from MSD and Lower Area One (LAO) (and certain captured surface water that is transported to the lagoon treatment facility) is



treated to ARAR standards, the plant can be operated efficiently and effectively in a variety of conditions, and sludge disposal can occur in accordance with the 2006 ROD and ARARs. The treatment plant will meet "end of pipe" discharge standards defined as the lesser of the chronic or human health surface water quality standards presented in Appendix B, Table 3.

Paired total recoverable and dissolved samples shall be collected and analyzed for COCs. Hardness-based standards will be calculated using the hardness of the sample collected from the treatment plant discharge, as directed by Circular DEQ-7. Two, 24-hour composite samples will be collected each week on random days to monitor compliance (for example, sampling will not be limited to Mondays and Thursdays).

Other analytes that shall be monitored include: dissolved calcium and magnesium (for hardness calculations), total alkalinity, total dissolved solids, total suspended solids, and sulfate. Temperature and pH will be monitored daily. Additional required field parameters will be determined based on the operational needs of the facility.

### **2.3.6 Surface Water Monitoring and Compliance Requirements**

Comprehensive surface water monitoring is required. Sampling provides information to determine sources of continuing wet weather contamination among other things, and routine monitoring and annual data report and analysis is required. Compliance with in-stream ARAR standards in baseflow and wet weather conditions is required over time.

### **2.3.7 Other Remedial Components – Syndicate Pit, Granite Mountain Memorial Interpretative Area, and Butte Mine Waste Repository**

The Syndicate Pit within the BPSOU shall be reclaimed, to the extent practicable, for use as a mine training center if feasible. Shallow to moderate slopes will be reclaimed using soils caps, rock caps, and gravel parking areas. Steep slopes will not be reclaimed. The pit base will continue to be used as a sediment basin. The Granite Mountain Memorial Interpretative Area shall be subject to various reclamation and enhancements in keeping with its historical character. These include reclaiming source areas in publicly used areas, restricting access to certain areas of historic mining landscape, installing picnic areas and walking trails, enhancing existing vegetation, and diverting storm water runoff to the Berkeley Pit. These actions shall be consistent with the preservation requirements and other standards and the county's historical park plan. A Butte Mine Waste Repository was previously established and shall be used for the disposal of removed waste and contamination associated with BPSOU response actions. When the existing structure is full, it shall be closed in compliance with ARARs. A new repository will be sited next to the existing repository if that capacity is needed. It, too, would be closed using the same methods.

### **2.3.8 Institutional Controls**

The 2006 BPSOU ROD requires the development, implementation, funding and enforcement and implementation of the following institutional controls (ICs): A. a controlled ground water area for the alluvial aquifer Technicality Impracticability zone to prevent domestic use of the contaminated ground water there as well as other controls for ground water use; B. Butte Silver Bow enacted zoning and ordinance/permit requirements for storm water controls, protection of capped and waste in place areas, removal and disposal of contaminated dirt, as well as other possible requirements; C. Deed notices under Montana state law for capped and waste in place areas; and D. fencing and signs where appropriate.



### **2.3.9 Operations and Maintenance**

There are several short-term O&M plans in existence for various actions within the BPSOU. The Selected Remedy requires the development of long-term and integrated comprehensive monitoring and O&M plans for all aspects of the Selected Remedy.

## **Section 3**

### **Description of Significant Differences and Basis for Decision**

Table 3-1 summarizes the significant differences between Section 2 (Selected Remedy) of the BPSOU ROD and this ESD. The following sections discuss each of the five differences.

### **3.1 Residential Metals Abatement Program**

#### **3.1.1 Residential Assessment and Remediation Timeframe**

The ROD stated that the assessment of all residential properties within the BPSOU will occur in 8 years and all contaminated residential properties within the BPSOU would be remediated in 15 years.

#### **Change to ROD Language**

The change made by this ESD is as follows: Assessments of all residential properties within the BPSOU shall occur in 10 years and all contaminated residential properties within the BPSOU shall be remediated in 20 years. To accomplish these requirements, yearly goals for sampling and remediation contained in the *Final Multi-Pathway Residential Metals Abatement Program Plan* (RMAP) (April 2010 by Butte Silver Bow County and Atlantic Richfield Company) page 11 must be confirmed through yearly reporting, as provided in RMAP section 15, or revised appropriately. The 10 and 20 year time frames for completion of these activities began in 2009 as reflected in the RMAP. Other requirements specified in the ROD regarding residential area cleanup are not changed except as specifically provided in this ESD.

#### **Explanation of Change**

During the implementation of Remedial Design and the development of the RMAP, the plan which will implement the residential contamination component of the Selected Remedy, the time frames described above were requested by the implementing Responsible Parties to address both mining and non-mining related lead, arsenic, and mercury contamination at all residential properties that exceed action levels within the BPSOU and attic dust in the defined Adjacent Area. By including the non-mining related contamination in the RMAP, more time was needed due to the expansion of the program. Accordingly, the time frames for completion of the assessments and remediation were increased by 2 and 5 years, respectfully. EPA, in consultation with DEQ, determined that such changes were reasonable, added to the overall protection of human health through implementation of the Multi-Pathway Program, and met basic requirements for cleanup of mining related contaminants above actions levels in yard soils and indoor dust.



### **3.1.2 Depth of Soil Sampling**

The ROD called for soil sampling in residential areas from 0 to 2 inches.

#### **Change in ROD Language**

The change made by this ESD is as follows: Samples will be collected in residential areas at depths of 0 to 2 inches, 2 to 6 inches, and 6 to 12 inches, and reported accordingly.

#### **Explanation of Change**

The change in soil depth sampling will better define the presence of contamination for the constituents of concern at three increments instead of the original one sample that was collected. The three sampling depths will determine if the contamination is present only at the surface or is at depth. For residential property, if the contamination is only surficial and removed, then ICs would not be necessary for the property. If contamination is at depth and not removed, ICs may be needed.

### **3.1.3 Depth of Soil Removal and Replacement**

The ROD called for decision units exceeding the action levels to be subject to soil removal and replacement to a minimum depth of 18 inches.

#### **Change in ROD Language**

The change made by this ESD is as follows: Contaminated soil which exceeds action levels shall be removed from residential areas to a minimum depth of 12 inches or to the soil bedrock interface (if bedrock is encountered before the 12-inch depth).

#### **Explanation of Change**

This change is consistent with national EPA guidance as defined in the Superfund Lead Contaminated Residential Sites Handbook, August 2003 (EPA 2003). The rationale for establishing a minimum cover thickness of 12 inches is that the top 12 inches of soil in a residential yard can be considered to be available for direct human contact. With the exception of gardening, the typical activities of children and adults in residential properties do not extend below 12-inch depth. Removal to a depth of 24 inches in vegetable garden areas will not be changed.

## **3.2 Non-Residential Contamination**

### **3.2.1 Wake-Up Jim Site 1615**

The ROD called for reclamation of the Wake-Up Jim site 1615.

#### **Change in ROD Language**

The change made by this ESD is as follows: EPA, in consultation with DEQ, has determined that the Wake-Up Jim site 1615 will not be reclaimed.



**Explanation of Change**

Wake-Up Jim site 1615 is a small area of mine waste located outside of the residential area of the BPSOU. There is no public access at this site as it is located within a fenced area of the Historic Mining Landscape of the Granite Mountain Memorial Interpretation Area (which has appropriate access and institutional land use controls) resulting in no potential for direct human contact (See Figure 3-1). Furthermore, the EPA found that the stormwater from the site flows to the Berkeley Pit. Accordingly, reclamation is not necessary for the Wake-Up Jim site. Management of the Wake-Up Jim site shall be included in the O&M plan for the Granite Mountain Memorial Interpretation Area.

**3.3 Groundwater Monitoring****3.3.1 Dye Tracer Monitoring at MSD Sub-Drain**

The ROD called for groundwater loads entering the MSD sub-drain to be monitored annually in the fall (base flow) using dye tracer methods to determine flow and standard sampling to measure metals and arsenic concentrations.

**Change in ROD Language**

The change made by this ESD is as follows: Additional dye tracer studies will not be completed in the vicinity of the MSD sub-drain. Load monitoring will be conducted using dedicated flumes and sampling via manholes as described below.

**Explanation of Change**

Load monitoring using tracer dye methodology as described in the 2006 ROD was completed once in 2009 for the MSD Subdrain. It was anticipated that the results of the dye tracer study (PTS 2010) would provide information into loading and mass balance of the groundwater in the vicinity of the MSD. This information could be used to provide insight into the contribution of different sources of groundwater along the length of the MSD subdrain, and to determine reaches of the subdrain that have highest influx of contaminants. Multiple methods of flow determination were utilized in the study, and consistent results between the methods were not attained. This investigation concluded that alternative methods of measuring flows and loading would be equally effective and easier to implement than dye tracer methodology. The EPA and DEQ agree that the initial dye tracer study did not provide the anticipated data and results, and thus additional dye tracer studies will not be performed. Therefore, the utilization of a flume or other simple method for monitoring flows within the MSD will be implemented as follows.

The groundwater loads entering the MSD sub-drain will be monitored twice yearly – during high flow (June – July) and low flow (October - November using flumes installed within manholes in the MSD Subdrain. The flow monitoring shall also include use of a mass balance analysis to determine that the pumping rate is matching the groundwater collection rate, and that the subdrain is not adding contaminated groundwater back into the aquifer in the vicinity of the pump vault.

A load monitoring plan shall be developed as a part of overall Operation and Maintenance plan for the MSD. The load monitoring plan shall provide data, information, and analysis to determine whether the subdrain continues to operate as is necessary to ensure adequate capture



of incoming loads and is not fouling or clogging. Reporting shall be yearly under the plan. At a minimum, the load monitoring plan shall address the following elements:

- Determine a pumping level in the vault that ensures that the subdrain is not adding contaminated water back into the aquifer in the vicinity of the pump vault;
- Establish flumes or weirs and totalizers within the subdrain to continuously monitor flow;
- Identify monitoring wells adjacent to the subdrain to be monitored that will signify when subdrain cleanouts are needed;
- Contain and overall description of flow measurement and monitoring procedures;
- Contain location and description of monitoring points;
- Contain a description of flow measurement techniques;
- Describe the development of a Standard Operating Procedure (SOP) for the flow measurement and water sampling within the subdrain; and
- Contain a clear monitoring and reporting schedule based on two monitoring events per year to be conducted at high water table conditions (approximately June or July) and low water table conditions (approximately October or November) of each year.
- An annual data summary report shall be prepared no later than June 30 of the year following data collection that includes: all measurements, analytical results and field notes for monitoring events; all flow rate and pumping rate data for the year; water level data from pertinent monitoring wells for the year; all analytical data pertinent to the subdrain collected between monitoring events; calculation of loads and mass balance to determine if the pumping rate is matching the subdrain collection rates and to assure that the subdrain is not adding contaminated water back into the aquifer near the pump vault; recommendations for operations changes, if needed; and other elements typical of a data summary report.

EPA notes that other groundwater tests and data reports, including the February 2010 pump test and other reports, will continue to add to the understanding of the alluvial aquifer and the requirements for the final implementation of the groundwater component of the Selected Remedy as that component is described in the ROD.

## Section 4

### Support Agency Comments

#### 4.1 DEQ Comments on the ESD.

DEQ reviewed this ESD prior to issuance. Comments from DEQ have been addressed in the document by inclusion except as noted here.



**BRES.** DEQ believes there are significant problems with the BRES procedure made evident by the 2007 – 2010 BRES inspections and evaluations. DEQ believes the ESD should acknowledge the scope and level of effort necessary for BRES implementation at the over 200 sites which make up the BRES system. DEQ also believes that the ESD should require a report which sets forth criteria, based on the 2007 – 2010 BRES inspections and evaluations, for reanalyzing certain sites where the BRES procedure seems inappropriate. DEQ believes that for the significant majority of the BRES sites, this step is not necessary, but for those where it is needed, more than maintenance is required.

**Dye Tracer Monitoring.** DEQ agrees with the use of weirs or flumes in place of the dye tracing monitoring at the MSD Sub-Drain, but believes the flume monitoring as presented in the ESD does not adequately meet the ROD purposes and requirements without the inclusion of a new manhole between Casey Street and Harrison Avenue and the inclusions of flow barriers to direct flow out of the gravel pack and through the weir flume.

**Metro Storm Drain Wastes.** DEQ believes the most substantial data generated since the signing of the ROD that should prompt reassessment of portions of the selected remedy is the February 2010 pumping test data. DEQ believes that this pumping test, performed pursuant to Section 12.3.2.3(6) of the BPSOU ROD, invalidated the assumptions and basis for the ROD's remedy determination for the MSD groundwater and related TI waiver. DEQ believes that the ESD needs to recognize the February 2010 pumping test results and note how the study and monitoring will assist in meeting the requirements of the ROD.

#### **4.2 EPA's response to DEQ comments**

**BRES.** EPA did not include DEQ's remedy change relating to the non-application of BRES procedures to certain of the capped sites in the BPSOU. The BRES system, properly implemented, already provides for the full upgrade of all capped sites to ROD-required standards, through corrective action, in a consistent manner, along with maintenance. EPA is committed to ensuring that the BRES system is fully implemented in a timely manner and is taking enforcement steps to ensure that happens. EPA believes that treating all capped sites under a uniform and consistent system like BRES remains the appropriate response action to ensure the long term and permanent maintenance of the capped areas. EPA can provide level of effort estimates if needed during enforcement proceedings.

**Dye Tracer Monitoring.** EPA will continue to evaluate the need for additional manhole(s) and flow barriers as part of the final design for the MSD pump vault area, in consultation with DEQ. EPA did not include flow barriers (and related manholes) at this time because experience at the MSD pump vault area indicates that such barriers tend to restrict flow and impair function of the collection system, and may lead to liner dislocation in the area.

**Metro Storm Drain Wastes.** In response to the DEQ's concerns, EPA did include language in this ESD, at the end of section 3.3.1, that expresses its commitment to continue to use all available data, including the February 2010 pumping test data, in conducting remedial design for purposes of designing a final, protective interception and pumping system and other ground water control measures in the Metro Storm Drain area in accordance with the BPSOU ROD. EPA does not believe that the February 2010 pumping test data, which is one report among



many data reports and analysis conducted as part of remedial design, invalidated the assumptions and basis for the ROD's remedy determination for the MSD groundwater and related TI waiver. Although the aquifer test results did increase our understanding of flow rates in the middle part of the alluvial aquifer and do vary from the flow rate assumptions in the 2006 BPSOU alluvial aquifer TI Evaluation document and similar documents, that change alone does not "invalidate" the assumptions and basis for the ROD's remedy determination for the MSD groundwater and related TI waiver. The BPSOU alluvial ground water TI evaluation used a weight of evidence approach using such information as the wide distribution of mine waste and contaminated aquifer materials acting as primary and secondary sources and the heterogeneity of the aquifer limiting the kinetics of desorption that would extend the time to attain groundwater ARARs. EPA believes this analysis remains valid based on current data on the contaminated groundwater plume. EPA is committed to protecting Silver Bow Creek through the vigorous implementation of the MSD interception and pumping facility requirements and other ground water control measures as part of the existing ROD.

## Section 5

### Public Participation Compliance

In accordance with NCP Section 300.435(c)(2)(i), to issue an ESD, the lead agency shall:

*(A) Make the explanation of significant differences and supporting information available to the public in the administrative record established under NCP § 300.815 and the information repository; and*

*(B) Publish a notice that briefly summarizes the explanation of significant differences . . . in a major local newspaper of general circulation;*

The lead agency, EPA, will publish a public notice in the *Montana Standard* that briefly summarizes the changes presented in the ESD. This is a local newspaper of general circulation, in accordance with NCP Section 300.435(c)(2)(i)(B). Additionally, a copy of this ESD and supporting information will be placed in the BPSOU Administrative Record and in two local information repositories as described in Section 1 of this ESD.

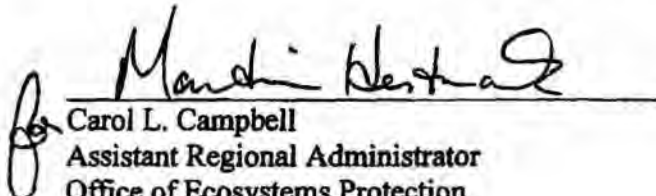


## Section 6

### Statutory Determinations

Considering the new information presented in this ESD and the changes that have been made to the Selected Remedy, EPA believes that the Selected Remedy, as modified by this ESD, remains protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to this operable unit or involves appropriate waivers of these requirements, and is cost effective.

#### APPROVAL

  
for Carol L. Campbell  
Assistant Regional Administrator  
Office of Ecosystems Protection  
And Remediation

7/18/11  
Date



Figures



## **Figures**



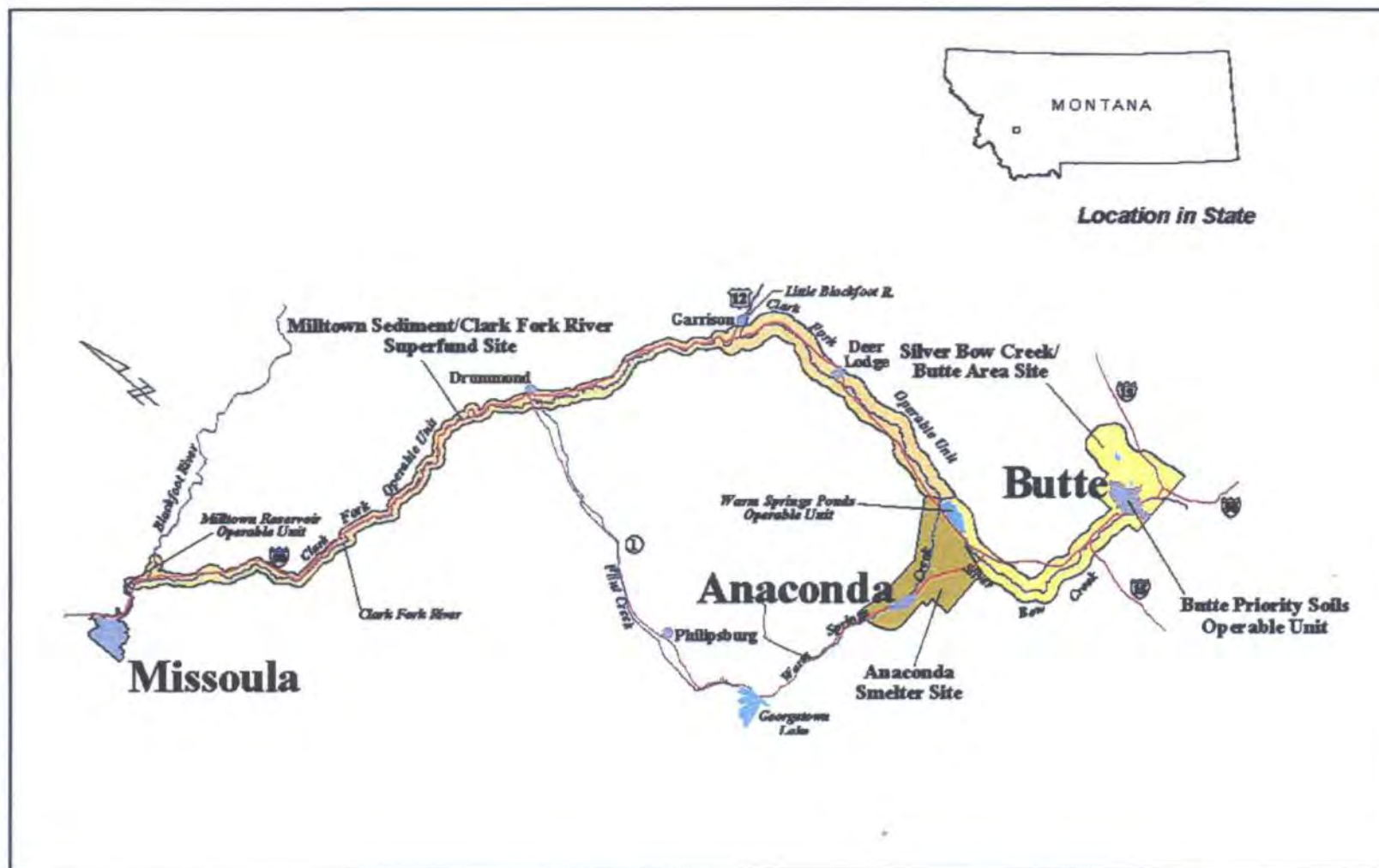
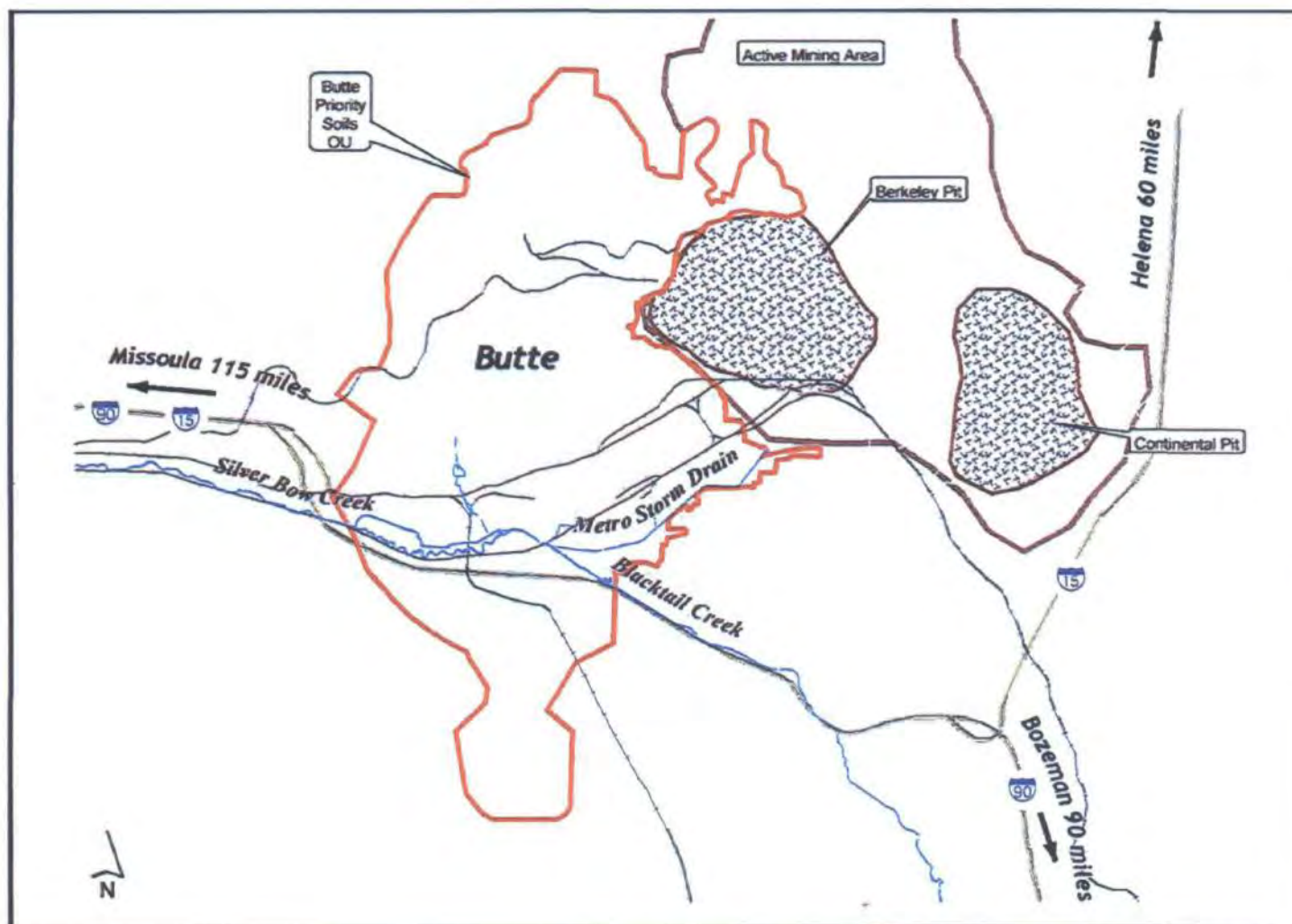


Figure 1-1  
Site Location







**Figure 1-2**  
**Butte Priority Soils OU Site Map**







**Figure 3-1**  
**Wake-Up Jim Site Location**





# Tables



**Table 3-1**



Table 3-1

## Significant Differences between BPSOU Selected Remedy and Explanation of Significant Differences

Difference	ROD Section and page	2006 BPSOU Record of Decision Text	Revised Explanation of Significant Differences Text (strike-out text is deleted; underlined text is added)	Basis for Difference
Residential Metals Abatement Program Timeframes	12.1.1 page 12-2	If the Superfund remedial requirements are incorporated into the existing and expanded comprehensive program, complete indoor and outdoor assessment (i.e., residential yard soil, indoor and outdoor dust, non-living space dust, lead-based paint, drinking water, and mercury vapor) of all residential properties that are known to be occupied or expected to be occupied must be completed within 8 years of the initiation of the expanded program. During this 8-year period, the cleanup of residential properties that exceed the actions levels will occur in concert with the assessment program. The Selected Remedy requires the assessment and abatement activities be completed in no later than 15 years.	If the Superfund remedial requirements are incorporated into the existing and expanded comprehensive program, complete indoor and outdoor assessment (i.e., residential yard soil, indoor and outdoor dust, non-living space dust, lead-based paint, drinking water, and mercury vapor) of all residential properties that are known to be occupied or expected to be occupied must be completed within <u>8</u> <del>10</del> years of the initiation of the expanded program. During this <u>8</u> <del>10</del> -year period, the cleanup of residential properties that exceed the actions levels will occur in concert with the assessment program. The Selected Remedy requires the assessment and abatement activities be completed in no later than <del>15</del> 20 years.	RD was implemented to include both mining and non-mining related contamination at residential properties. The addition of non-mining related contamination required extension of the RA time frame.
	12.3.1.1 pages 12-15 to 12-16	The Selected Remedy requires that all residential properties be sampled, assessed, and abated within 15 years. A complete indoor and outdoor assessment (i.e., residential yard soil, indoor and outdoor dust, non-living space dust, lead-based paint, drinking water, and mercury vapor) of all residential properties that are known to be occupied or expected to	The Selected Remedy requires that all residential properties be sampled, assessed, and abated within <del>15</del> <u>20</u> years. A complete indoor and outdoor assessment (i.e., residential yard soil, indoor and outdoor dust, non-living space dust, lead-based paint, drinking water, and mercury vapor) of all residential properties that are known to be occupied or expected to be occupied must be completed within the first <u>8</u> <del>10</del> years of the initiation of the expanded program.	



Difference	ROD Section and page	2006 BPSOU Record of Decision Text	Revised Explanation of Significant Differences Text (strike-out text is deleted; underlined text is added)	Basis for Difference
		be occupied must be completed within the first 8 years of the initiation of the expanded program. During this 8-year period, the clean-up of residential properties that exceed the action levels will occur in concert with the assessment program.	During this <del>8</del> <u>10</u> -year period, the clean-up of residential properties that exceed the action levels will occur in concert with the assessment program.	
	12.3.1.1 page 12-16	This ROD requires that all residential properties be assessed within 8 years.	This ROD requires that all residential properties be assessed within <del>8</del> <u>10</u> years.	
	12.3.1.1 page 12-16	At least 94 properties per year will need to be addressed to complete the remediation of all residential properties within the required 15 years.  According to BSB, 59 percent of properties that have required residential soil abatements have also needed house abatements, resulting in an estimated 831 homes that may require remediation. Using this estimate, about 56 house abatements will need to be conducted per year to complete remediation within the required 15 years.	<u>All</u> <del>At least</del> 94 properties <del>per year</del> will need to be addressed to complete the remediation of all residential properties within the required <del>15</del> <u>20</u> years. <u>Yearly goals for completion of all properties for assessment and abatement established in remedial design plans shall be achieved or adjusted and yearly reporting is required.</u>  <del>According to BSB, 59 percent of properties that have required residential soil abatements have also needed house abatements, resulting in an estimated 831 homes that may require remediation. Using this estimate, about 56 house abatements will need to be conducted per year to complete remediation within the required 15 years.</del>	
Residential Metals Abatement Program Soil	12.3.1.1 page 12-20	At a minimum, soil will be sampled from the 0 to 2-inch depth interval within decision units (e.g., front yard, back	At a minimum, soil will be sampled from the 0 to 2-inch, <u>2 to 6 inch</u> , and <u>6 to 12 inch</u> depth intervals within decision units (e.g., front yard, back yard, play	The additional sampling allows determination if the contamination is



Difference	ROD Section and page	2006 BPSOU Record of Decision Text	Revised Explanation of Significant Differences Text (strike-out text is deleted; underlined text is added)	Basis for Difference
Sampling Depths		yard, play area, driveway, etc.)...	area, driveway, etc.)...	surficial or is at depth.
Residential Metals Abatement Program Soil Removal and Replacement Depths	12.3.1.1 page 12-20	...and those decision units exceeding the action levels will be subject to soil removal and replacement to a minimum depth of 18 inches.	...and those decision units exceeding the action levels will be subject to soil removal and replacement to a minimum depth of <del>18</del> <u>12</u> inches.	The change was made to be consistent with the Superfund Lead Contaminated Sites Handbook
Non-Residential Contamination Wake-Up Jim Site Change	12.3.1.2 page 12-24	▪ Wake Up Jim Site 1615	▪ <del>Wake Up Jim Site 1615</del>	The Wake-up Jim Site is incorporated into a fenced area where no public access is allowed. Additionally, runoff flows into the Berkeley Pit.
Ground Water Monitoring: Dye Tracer change	12.3.2.3 page 12-39	The groundwater loads entering the MSD sub-drain will be monitored annually in the fall (base flow) using dye tracer methods to determine flow and standard sampling to measure metals and arsenic concentrations.	▪ The groundwater loads entering the MSD sub-drain will be monitored <del>annually in the fall (base flow)</del> using <del>dye tracer methods to determine flow and standard sampling to measure metals and arsenic concentrations.</del> <u>flumes installed within manholes in the MSD Subdrain. Additionally, a load monitoring plan shall be developed as a part of overall Operation and Maintenance plan for the MSD. The load monitoring plan shall provide data, information, and analysis to determine whether the subdrain continues to operate as is necessary to ensure adequate capture of incoming</u>	Load monitoring as described in the 2006 was completed once in 2009 ROD for the MSD Subdrain. This investigation concluded that alternative methods of measuring flows and loading would



Difference	ROD Section and page	2006 BPSOU Record of Decision Text	Revised Explanation of Significant Differences Text (strike-out text is deleted; underlined text is added)	Basis for Difference
			<p>loads and is not fouling or clogging. At a <u>minimum, the load monitoring plan shall address the following elements:</u></p> <ul style="list-style-type: none"> <li>• <u>Determine a pumping level in the vault that ensures that the subdrain is not adding contaminated water back into the aquifer in the vicinity of the pump vault;</u></li> <li>• <u>Establish flumes or weirs and totalizers within the subdrain to continuously monitor flow;</u></li> <li>• <u>Identify monitoring wells adjacent to the subdrain to be monitored that will signify when subdrain cleanouts are needed;</u></li> <li>• <u>Contain and overall description of flow measurement and monitoring procedures;</u></li> <li>• <u>Contain location and description of monitoring points;</u></li> <li>• <u>Contain a description of flow measurement techniques;</u></li> <li>• <u>Describe the development of an SOP for the flow measurement and water sampling within the subdrain; and</u></li> <li>■ <u>Contain a clear monitoring and reporting schedule based on two monitoring events per year to be conducted at high water table conditions (approximately June or July) and low water table</u></li> </ul>	<p>be equally effective and easier to implement than dye tracer methodology.</p>



Difference	ROD Section and page	2006 BPSOU Record of Decision Text	Revised Explanation of Significant Differences Text (strike-out text is deleted; underlined text is added)	Basis for Difference
			<p><u>conditions (approximately October or November) of each year.</u></p> <ul style="list-style-type: none"> <li>■ <u>An annual data summary report shall be prepared no later than June 30 of the year following data collection that includes: all measurements, analytical results and field notes for monitoring events; all flow rate and pumping rate data for the year; water level data from pertinent monitoring wells for the year; all analytical data pertinent to the subdrain collected between monitoring events; calculation of loads and mass balance to determine if the pumping rate is matching the subdrain collection rates and to assure that the subdrain is not adding contaminated water back into the aquifer near the pump vault; recommendations for operations changes, if needed; and other elements typical of a data summary report.</u></li> </ul>	



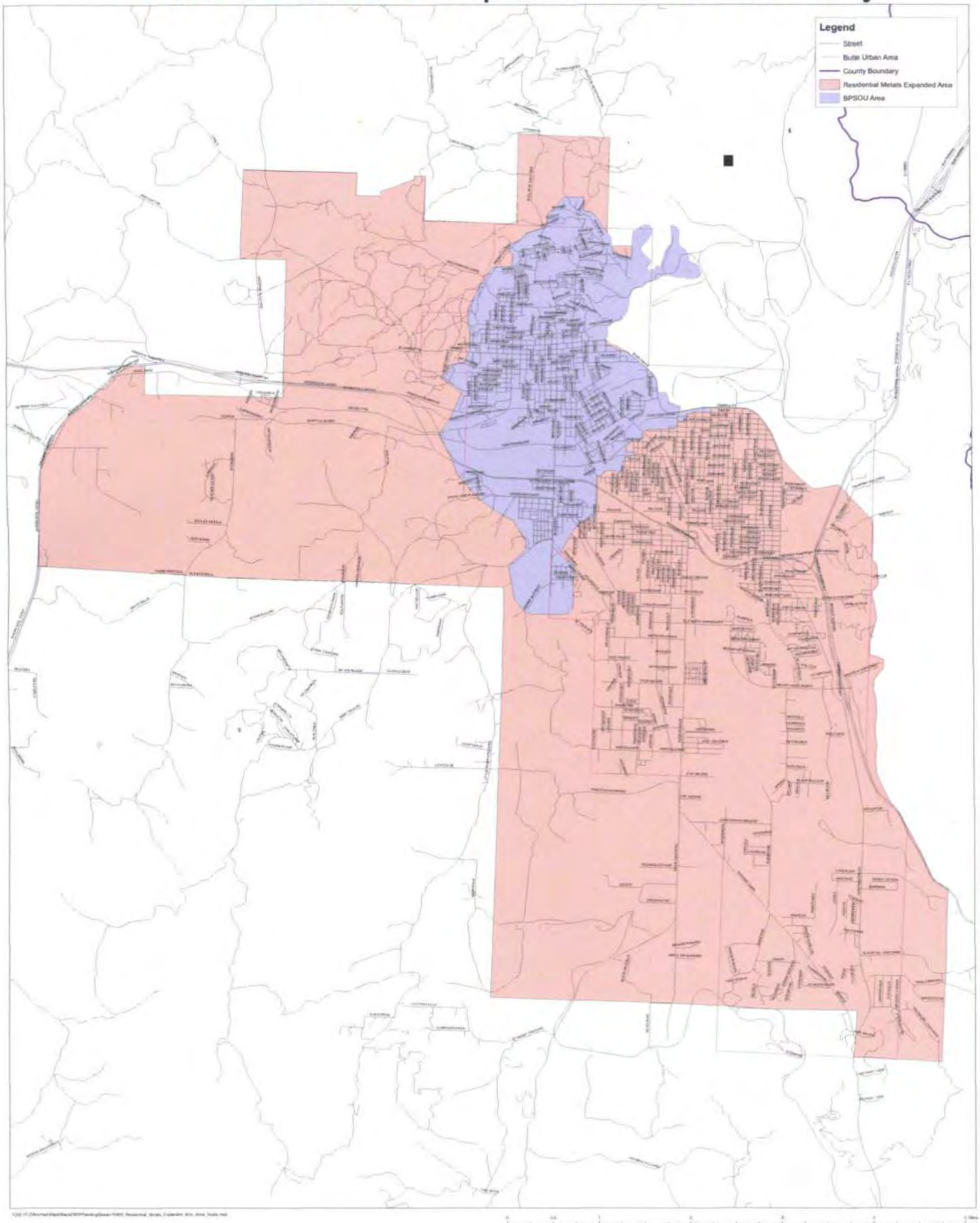
# Appendices



## **Appendix A**



# Residential Metals Expanded Area Attic Only





## **Appendix B**



**Table 2**  
**Standards for Ground Water**

<b>COC</b>	<b>Standard (Dissolved)<sup>1</sup></b>
Arsenic	10 µg/L
Cadmium	5 µg/L
Copper	1,300 µg/L
Lead	15 µg/L
Mercury	2 µg/L
Zinc	2,000 µg/L

<sup>1</sup> As presented in the BPRSOU ROD, these are equal to the DEQ-7 standards published in February 2006.

**Table 3**  
**Numeric Water Quality Standards**

<b>Contaminant</b>	<b>Human Health Standard (µg/L)</b>	<b>Chronic Aquatic Standard (µg/L)</b>	<b>Acute Aquatic Standard (µg/L)</b>	<b>Notes</b>
Aluminum	--	87	750	Dissolved fraction
Arsenic	10	150	340	
Cadmium	5	0.097	0.52	Hardness-dependent
Copper	1,300	2.85	3.79	Hardness-dependent
Iron	--	1,000	--	
Lead	15	0.545	13.98	Hardness-dependent
Mercury	0.05	0.91	1.7	
Silver	100	--	0.374	Hardness-dependent
Zinc	2,000	37	37	Hardness-dependent

Note: All standards are based on total recoverable analysis except for aluminum.

µg/L = micrograms per liter



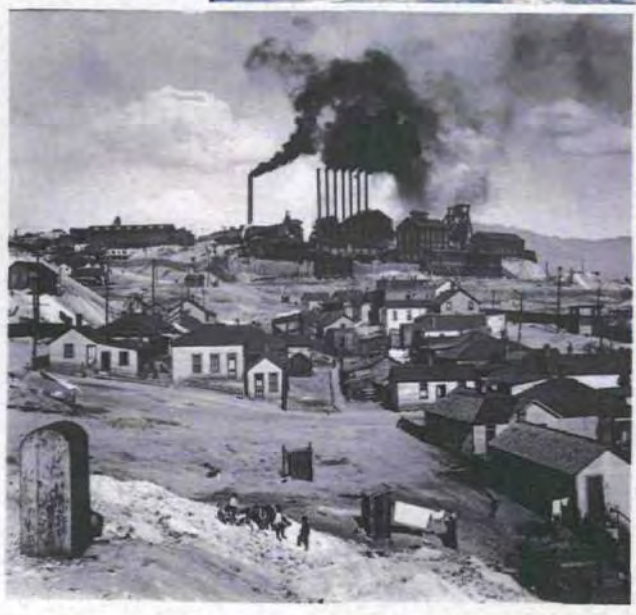
# U.S. Environmental Protection Agency

## Record of Decision

### Butte Priority Soils Operable Unit

### Silver Bow Creek/Butte Area NPL Site

September 2006



# *Record of Decision*

4030906



517222



# Contents



# **Record of Decision**

**Butte Priority Soils Operable Unit**

**Silver Bow Creek/Butte Area Superfund Site**

**Butte, Montana**

**September 2006**

U.S. Environmental Protection Agency  
Region 8, Montana Operations Office  
10 West 15th Street, Suite 3200  
Helena, Montana 59626

In consultation with and partial concurrence from:  
Montana Department of Environmental Quality  
1100 North Last Chance Gulch  
P.O. Box 200901  
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# Record of Decision

## Preface

### **Butte Priority Soils Operable Unit**

### **Silver Bow Creek/Butte Area Superfund Site**

### **Butte, Montana**

The U.S. Environmental Protection Agency (EPA), in consultation with the Montana Department of Environmental Quality (DEQ), presents this Record of Decision (ROD) for the Butte Priority Soils Operable Unit (BPSOU) of the Silver Bow Creek/Butte Area Superfund Site in Butte, Montana. The ROD is based on the Administrative Record for the BPSOU, including the Remedial Investigation (RI), the Feasibility Study (FS), the Focused Feasibility Study (FFS), several human health risk assessments (HHRA), the ecological risk assessment, the Proposed Plan, the public comments received, and EPA responses to comments. The ROD presents a brief summary of the RI and FS, actual and potential risks to human health and the environment at the BPSOU, the major alternatives considered by EPA, and the Selected Remedy. The Selected Remedy was chosen by EPA in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended (42 United States Code [USC] § 9601 *et seq.*), and in accordance with the National Pollution Contingency Plan (NCP) [40 Code of Federal Regulations Part 300] to the extent practicable.

The ROD has three purposes:

- To describe the engineering components and remediation requirements of the Selected Remedy, including remedial action objectives, applicable, relevant and appropriate requirements (ARARs), and cleanup levels.
- To certify that the remedy selection process was carried out in accordance with the requirements of CERCLA, and, to the extent practicable, the NCP.
- To provide the public with a consolidated source of information about the history, characteristics, and risk posed by the conditions at the BPSOU, as well as a summary of the cleanup alternatives considered, their evaluation, the rationale behind the Selected Remedy, and the EPA's consideration of, and responses to, the comments received.

The ROD is organized into three distinct sections:

1. The Declaration section functions as an abstract and data certification sheet for the key information contained in the ROD. The signature page for the EPA Region 8 Assistant Regional Administrator and Director of the Montana Department of Environmental Quality is located in this section.



2. The Decision Summary section provides an overview of the BPSOU characteristics, the alternatives evaluated, and the analysis of those options. The Decision Summary also describes the Selected Remedy and explains how the remedy fulfills statutory and regulatory requirements.
3. The Responsiveness Summary section addresses stakeholder and public comments received on the Proposed Plan and other information contained in the Administrative Record.



# Contents

## Preface

## Part 1 - Declaration

Declaration .....	D-1
-------------------	-----

## Part 2 – Decision Summary

Section 1	Site Name, Location, and Description.....	1-1
Section 2	Site History and Enforcement Activities .....	2-1
Section 3	Highlights of Community Participation.....	3-1
3.1	Release of a Proposed Plan.....	3-1
3.2	Monthly “Superfund and You” Newspaper Column .....	3-2
3.3	EPA Press Release.....	3-2
3.4	Display Advertisements.....	3-3
3.5	Public Comment Period .....	3-3
3.6	Summary Fact Sheet .....	3-3
3.7	Public Hearings .....	3-3
3.8	EPA Web Site.....	3-4
3.9	Butte Citizen’s Working Group .....	3-4
3.10	Available Supporting Documents .....	3-4
3.11	Responsiveness Summary .....	3-5
Section 4	Scope and Role of Operable Unit.....	4-1
Section 5	Summary of Site Characteristics .....	5-1
5.1	Site Overview .....	5-1
5.2	Solid Media Characterization.....	5-2
5.2.1	Residential Soil, Indoor Dust, and Attic Dust Characterization.....	5-2
5.2.2	Non-Residential Soil/Waste Characterization .....	5-4
5.3	Groundwater Characterization.....	5-13
5.3.1	Hydrogeologic Data .....	5-19
5.3.2	Lower Area One.....	5-21
5.3.3	Metro Storm Drain.....	5-29
5.4	Surface Water Characterization .....	5-37
5.4.1	Base Flow Conditions.....	5-39
5.4.2	Wet Weather Conditions.....	5-41
5.4.3	Surface Water Summary .....	5-45
5.5	Air Characterization .....	5-45
5.6	Site Conceptual Model .....	5-46
5.6.1	Human Receptors .....	5-48
5.6.2	Ecological Receptors.....	5-48
5.7	Historic and Cultural Resources.....	5-51
Section 6	Current and Potential Future Land and Resource Uses.....	6-1
6.1	Land Use .....	6-1
6.2	Economy of Butte.....	6-1
6.3	Redevelopment in the Cleanup Process .....	6-3



6.4	Surface Water Use.....	6-5
6.5	Groundwater Use.....	6-7
Section 7	Summary of Site Risks.....	7-1
7.1	Human Health Risks .....	7-1
7.1.1	Preliminary Baseline Human Health Risk Assessment for Lower Area One 7-3	
7.1.2	Baseline Human Health Risk Assessment for Lead.....	7-3
7.1.3	Baseline Human Health Risk Assessment for Arsenic.....	7-4
7.1.4	Technical Memorandum: Addendum to the Baseline Human Health Risk Assessment; Evaluation of Human Health Risks Associated with Exposure to Alluvial Ground Water .....	7-4
7.1.5	Human Health Risk Assessment, Walkerville Residential Site .....	7-5
7.2	Ecological Risk.....	7-6
7.3	Remaining Risk .....	7-9
7.4	Basis of Action.....	7-10
Section 8	Remedial Action Objectives and Remedial Goals.....	8-1
8.1	Solid Media 8-1	
8.1.1	Remedial Action Objectives .....	8-2
8.1.2	Remedial Goals .....	8-2
8.2	Groundwater .....	8-3
8.2.1	Remedial Action Objectives .....	8-4
8.2.2	Remedial Goals .....	8-4
8.3	Surface Water .....	8-5
8.3.1	Remedial Action Objectives .....	8-6
8.3.2	Remedial Goals .....	8-6
Section 9	Description of Alternatives.....	9-1
9.1	Development of Alternatives .....	9-1
9.2	Integration of Past Response Actions.....	9-1
9.3	Remedial Alternatives.....	9-3
9.4	Common Elements of the Site-Wide Alternatives.....	9-4
9.5	Distinctions Among Alternatives .....	9-6
9.6	Comprehensive Alternatives.....	9-7
Section 10	Comparative Analysis of Alternatives.....	10-1
10.1	Threshold Criteria.....	10-1
10.2	Primary Balancing Criteria .....	10-3
10.3	Modifying Criteria .....	10-7
Section 11	Principal Threat Wastes .....	11-1
Section 12	Selected Remedy .....	12-1
12.1	Short Description of the Selected Remedy .....	12-1
12.1.1	Solid Media .....	12-1
12.1.2	Groundwater .....	12-5
12.1.3	Surface Water .....	12-8
12.1.4	Institutional Controls .....	12-10
12.1.5	Operations and Maintenance .....	12-11



12.1.6	Section Organization .....	12-11
12.2	Rationale for the Selected Remedy .....	12-11
12.3	Detailed Description of the Selected Remedy .....	12-14
12.3.1	Selected Remedy for Solid Media .....	12-14
12.3.2	Selected Remedy for Groundwater .....	12-32
12.3.3	Selected Remedy for Surface Water .....	12-40
12.3.4	Role of Institutional Controls in the Selected Remedy .....	12-44
12.4	Estimated Cost of Selected Remedy .....	12-46
12.5	Expected Outcomes of Selected Remedy .....	12-56
12.6	Performance Standards .....	12-57
12.6.1	Solid Media .....	12-58
12.6.2	Groundwater .....	12-59
12.6.3	Surface Water .....	12-59
12.7	Environmental Justice .....	12-62
Section 13	Statutory Determinations .....	13-1
13.1	Protection of Human Health and the Environment .....	13-1
13.1.1	Solid Media .....	13-1
13.1.2	Groundwater .....	13-2
13.1.3	Surface Water .....	13-2
13.2	Compliance with ARARs .....	13-3
13.2.1	Solid Media .....	13-4
13.2.2	Groundwater .....	13-4
13.2.3	Surface Water .....	13-5
13.2.4	Other ARARs .....	13-6
13.3	Cost Effectiveness .....	13-7
13.4	Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable .....	13-8
13.5	Preference for Treatment as a Principal Element .....	13-9
13.6	Five-Year Reviews .....	13-9
Section 14	Documentation of Significant Changes .....	14-1
Section 15	Coordination with Natural Resource Damage Restoration Actions .....	15-1
Section 16	References .....	16-1

### **Part 3 – Responsiveness Summary**

Section 1	Comment from the General Public
Section 2	Comments from Responsible Parties
Section 3	Response to Agency Comments



## Appendices

- Appendix A Identification and Description of Applicable or Relevant and Appropriate Requirements*  
*Appendix B Site Data*  
*Appendix C Support Agency Letter*  
*Appendix D List of BPSOU PRPs*  
*Appendix E Butte Reclamation Evaluation System*

## List of Figures

- Figure 1-1 Site Location  
Figure 1-2 Butte Priority Soils OU Site Map  
Figure 1-3 Land Use within the BPSOU  
Figure 2-1 Beginning of Butte Open Pit Mining Era (1954-1956)  
Figure 2-2 Butte Railroads and Sites Addressed in the Railroad TCRA  
Figure 4-1 Operable Units within the Silver Bow Creek/ Butte Area NPL Site  
Figure 5-1 Soil Sample Locations  
Figure 5-2 Lexington Head Frame and Mine Yard after Walkerville TCRA (Before and After)  
Figure 5-3 BPSOU Site Layout Map  
Figure 5-4 Historic Photo of Lower Area One  
Figure 5-5 Upper Silver Bow Creek Valley Alluvial Aquifer  
Figure 5-6 Potentiometric Surface Map of the Alluvial Aquifer  
Figure 5-7 Hydrologic Boundaries and Surface Water Features  
Figure 5-8 Key Surface Water Sampling Locations  
Figure 5-9 Butte Priority Soils OU Monitoring Well Network  
Figure 5-10 Pre-Removal Profile of the Colorado Tailings  
Figure 5-11 Pre-Removal Copper and Zinc Distribution in Lower Area One Groundwater  
Figure 5-12 Aerial Photo of Lower Area One (2002)  
Figure 5-13a Maximum Cadmium in Groundwater – LAO  
Figure 5-13b Maximum Copper in Groundwater –LAO  
Figure 5-13c Maximum Zinc in Groundwater –LAO  
Figure 5-14 Lower Area One Groundwater Capture Profile  
Figure 5-15 Profile of Alluvial Aquifer in Metro Storm Drain  
Figure 5-16 Waste Materials in Metro Storm Drain  
Figure 5-17a Maximum Cadmium in Groundwater –MSD  
Figure 5-17b Maximum Copper in Groundwater –MSD  
Figure 5-17c Maximum Zinc in Groundwater –MSD  
Figure 5-18 Metro Storm Drain Subdrain  
Figure 5-19 Butte Priority Soils Drainage Basins  
Figure 5-20 Total Recoverable Copper Concentration in Silver Bow Creek Directly Below Butte (Station SS-07)



Figure 5-21	Copper Concentrations for Wet Weather Flow Conditions at Station SS-07
Figure 5-22	Zinc Concentrations for Wet Weather Flow Conditions at Station SS-07
Figure 5-23	Average PM-10 Concentrations Greeley School Location (30-093-0005)
Figure 5-24	Site Conceptual Exposure Model - Human Receptors
Figure 5-25	Site Conceptual Exposure Model - Ecological Receptors
Figure 6-1	Relationship of the BPSOU to the Butte/Walkerville Urban Setting
Figure 6-2	Examples of the Public and Private Redevelopment at the Silver Bow Creek/Butte Area Site
Figure 12-1	Residential Remediation Decision Process Flowchart
Figure 12-2	Residential Metals Abatement Properties
Figure 12-3	Non-Residential Metals Abatement Properties
Figure 12-4	Previously Reclaimed Sites not Meeting ARARs
Figure 12-5	Sites to be Addressed as Initial BMP Actions
Figure 12-6	Alluvial Groundwater Technical Impracticability Zone
Figure 12-7	Surface Water Compliance Stations

## List of Tables

Table 2-1	Summary of Previous Soils Investigations
Table 2-2	Summary of Previous Surface Water and Sediment Investigations
Table 2-3	Summary of Previous Groundwater Investigations
Table 5-1	Quantities of Contaminated Soil
Table 5-2	Surface Water Summary Statistics for Base Flow (Prior to 1998)
Table 5-3	Surface Water Summary Statistics for Base Flow (1998 to 2002)
Table 8-1	Surface Water Quality Standards
Table 8-2	WQB-7 Standards and Federal Arsenic Standard for Groundwater
Table 9-1	Comprehensive Alternatives
Table 9-2	Matrix of Comprehensive Alternatives
Table 9-3	Costs of Each Comprehensive Alternative
Table 10-1	Evaluation of Comprehensive Alternatives
Table 12-1	Residential Soil, Dust, and Vapor Action Levels
Table 12-2	Action Levels for Contaminated Solid Media in Non-Residential Areas
Table 12-3	Summary of Capital Costs for Selected Remedy - Solid Media
Table 12-4	Summary of Capital Costs for Selected Remedy - Groundwater
Table 12-5	Summary of Capital Costs for Selected Remedy - Surface Water
Table 12-6	Summary of O&M Costs for Selected Remedy - Solid Media
Table 12-7	Summary of O&M Costs for Selected Remedy - Groundwater
Table 12-8	Summary of O&M Costs for Selected Remedy - Surface Water
Table 12-9	Summary of Capital and O&M Costs for Selected Remedy - Institutional Controls
Table 12-10	Cost Summary for Selected Remedy
Table 12-11	Expected Outcomes of the Selected Remedy



## Acronyms and Abbreviations

ACMC	Anaconda Copper Mining Company
amsl	above mean sea level
AOC	Administrative Order on Consent
AR	Atlantic Richfield
ARAR	applicable, relevant and appropriate requirement
ARCO	Atlantic Richfield Company
ARM	Administrative Rules of Montana
ATSDR	Agency for Toxic Substances and Disease Registry
BERA	baseline ecological risk assessment
BMFOU	Butte Mine Flooding Operable Unit
BMP	best management practice
BPSOU	Butte Priority Soils Operable Unit
BRA	baseline risk assessment
BRES	Butte Reclamation Evaluation System
BSB	Butte Silver Bow County
CDM	CDM Federal Programs Corporation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
CDC	Center for Disease Control
CFRSSI	Clark Fork River Superfund Site Investigations
cfs	cubic feet per second
COC	contaminant of concern
CTEC	Citizen's Technical Environmental Committee
cy	cubic yard
DEQ	Montana Department of Environmental Quality
DEQ-7	DEQ Circular No. 7
EPA	U. S. Environmental Protection Agency
ERA	expedited response action
ETAG	Ecological Technical Assistance Group
FS	feasibility study
FFS	focused feasibility study
GMMA	Granite Mountain Memorial Area
gpm	gallons per minute
HHRA	human health risk assessment
HQ	hazard quotient
IC	institutional control
IEUBK	Integrated Exposure Uptake Biokinetic
LAO	Lower Area One
MCA	Montana Code Annotated
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
mcy	million cubic yards



mg/kg	milligrams per kilograms
mg/L	milligrams per liter
MR	Montana Resources
MSD	Metro Storm Drain
NCP	National Contingency Plan
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
N-TCRA	non-time critical removal action
O&M	operations and maintenance
OMB	Office of Management and Budget
OU	operable unit
PBRA	preliminary baseline risk assessment
PRG	preliminary remediation goal
PRP	potentially responsible party
RAO	remedial action objective
RCRA	Resource Conservations and Recovery Act
RG	remedial goal
RHPP	Regional Historic Preservation Plan
RI	remedial investigation
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
RP	responsible party
SBC	Silver Bow Creek
SOP	standard operating procedure
SOW	statement of work
TAG	Technical Assistance Group
TCLP	toxicity characteristic leaching procedure
TCRA	time critical removal action
TI	technical impracticability
UAO	Unilateral Administrative Order
USGS	U.S. Geological Survey
UOS	URS Operating Systems, Inc.
URS	URS Greiner Woodward
USACE	U.S. Army Corps of Engineers
µg/L	micrograms per liter
µg/dL	micrograms per deciliter
µg/m <sup>3</sup>	micrograms per cubic meter



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Declaration

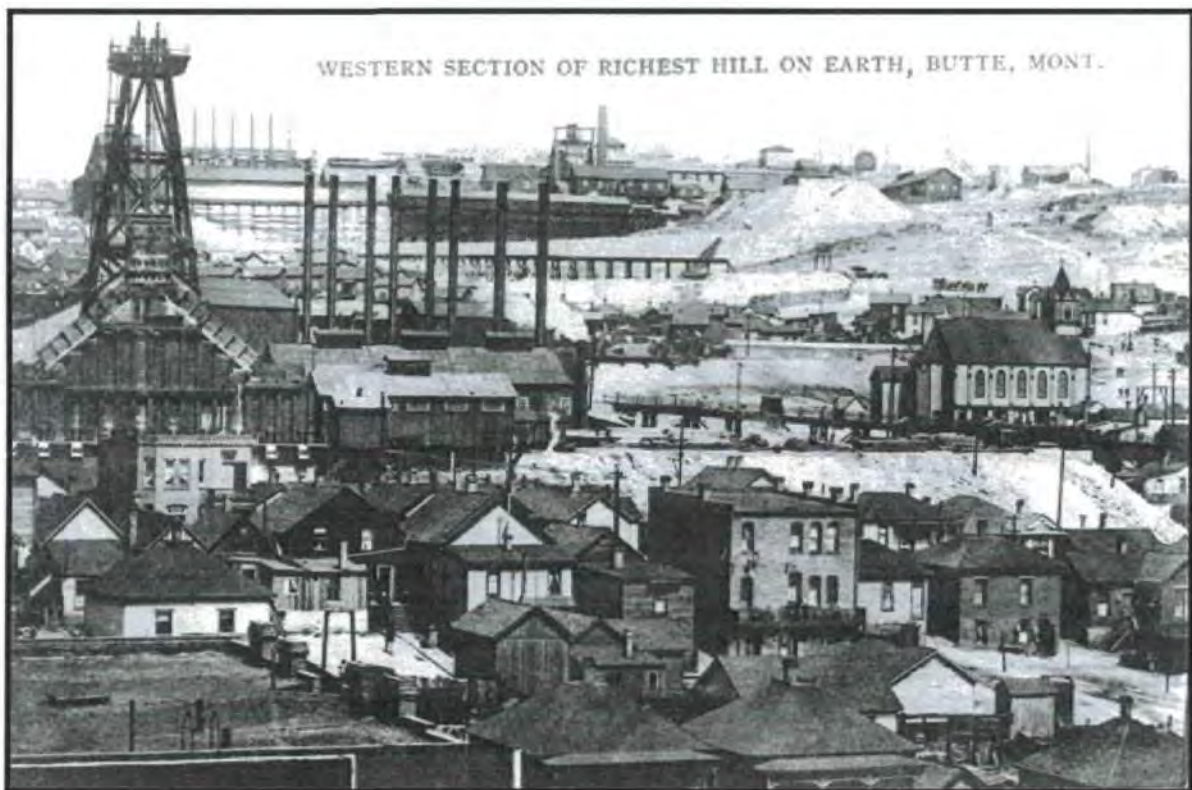
Declaration



**Record of Decision  
Butte Priority Soils Operable Unit  
Silver Bow Creek/Butte Area NPL Site**

U.S. Environmental Protection Agency, September 2006

**Part 1: Declaration**



***Declaration***



# Declaration

This part of the ROD summarizes key information and contains the formal authorizing signature page for the ROD.

## Site Name and Location

This decision document has been prepared for the Butte Priority Soils Operable Unit (BPSOU) of the Silver Bow Creek/Butte Area Superfund Site, in Silver Bow County, in southwest Montana. The national Superfund database (i.e., CERCLIS) identification number for the site is MTD980502777. The BPSOU is one of eight remedial operable units (OUs) within the Silver Bow Creek/Butte Area Site. It consists of an approximately 5 square mile area encompassing the town of Walkerville and a large portion of the city of Butte.

## Statement of Basis and Purpose

This decision document presents the Selected Remedy for the BPSOU (or “BPSOU site”) within the Silver Bow Creek/Butte Area Superfund Site in Butte. EPA, the lead agency for site activities, with the partial concurrence of DEQ, the support agency, selected the remedy in accordance with Comprehensive Environmental Response, Compensation, and Liability Act, 42 USC §9601 *et seq.*, as amended (CERCLA), and to the extent practicable, the NCP [40 CFR Part 300]. The State of Montana, as represented by DEQ, partially concurs with the Selected Remedy.

This decision is based on the Administrative Record for BPSOU within the Site. The Administrative Record (on microfilm) and copies of key documents are available for review at the following locations: Montana Tech Library, 1300 West Park in Butte, Montana; the Butte EPA Office, 155 West Granite in Butte, Montana. The complete written Administrative Record is maintained at the EPA - Montana Office, 10 West 15th Street, Suite 3200, in Helena, Montana and can be viewed there.

## Assessment of the Site

There are many pathways at the BPSOU site that create unacceptable risks to human health and the environment, as documented in the Administrative Record. The remedial action selected in this ROD is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment at the BPSOU site.

## Description of the Selected Remedy

The BPSOU is one of four remedial OUs identified by EPA within the Butte Portion of the Silver Bow Creek/Butte Area National Priorities List (NPL) site. A brief description of each of the OUs is provided below:

- Butte Priority Soils OU - consists of historic mining areas within and near the municipalities of Butte and Walkerville, surface water, and alluvial groundwater associated with Silver Bow Creek.



- Mine Flooding OU - consists of the flooding Berkeley Pit and hydraulically connected underground mine workings and associated bedrock and alluvial aquifers in Butte. It addresses the bedrock groundwater system, which underlies beneath and influences the BPSOU. EPA completed a ROD for this OU in 1994. The ROD, including its state-of-the-art treatment plant to provide perpetual treatment of groundwater and extensive monitoring, is being implemented.
- West Side Soils OU - encompasses areas of Silver Bow County that have experienced mining activity but lie outside of other OU boundaries, generally north and west of the BPSOU. EPA is currently conducting preliminary RI/FS planning for this OU.
- Active Mining and Milling OU - consists of the permitted mine area currently operated by Montana Resources (MR) west and northwest of the BPSOU. In 2002, EPA deferred Superfund action at the OU to state authority under the State issued mine-operating permit and associated State mining laws.

Numerous response actions, including time-critical removal actions, expedited response actions, and other reclamation activities, have been implemented at the BPSOU. These previous response actions and the Selected Remedy are discussed below.

## Previous Response Actions

The following is a summary of previously implemented response actions conducted within the BPSOU as Time-Critical Removal Actions (TCRAs) and Expedited Response Actions (ERAs, also known as Non-Time-Critical Removal Actions [N-TCRAs]). These actions were taken to address immediate and significant human health and environmental risks that EPA did not want to delay until the RI/FS and ROD process was completed. These response actions were subsequently evaluated as part of the RI/FS process.

The purpose of these early response actions was, in part, to address source areas that were found to have Contaminants of Concern (COCs) at concentrations that pose actual or potential human health and/or environmental risks. Approximately 422 acres of land within the BPSOU have been addressed through previous response actions. Previous response actions were completed using the expedited Superfund removal process. Although an expedited process was used, Superfund law requires these actions to be consistent with, and contribute to, the efficient performance of a final long-term remedial action, to the extent practicable. Therefore, EPA required that the early response actions be designed and constructed in a manner intended to be consistent with any final remedy.

Six TCRAs (Walkerville, 1988; Timber Butte, 1989; Butte Priority Soils, 1990-1991; Colorado Smelter, 1992; Anselmo/Late Acquisition/Silver Hill, 1992; and the Walkerville II, 1994) have been completed. Major construction for the on-going Storm Water TCRA and Railroad Beds TCRA was completed in 1999 and 2004, respectively. Two on-going expedited response actions include the Lower Area One (LAO) and the 1994 Residential/Source Areas (source areas and yards), which was amended to



include the 2000/2001 Walkerville TCRA. Other completed actions include the Lower Area One (LAO) Manganese Removal (1992), the Old Butte Landfill/Clark Mill Tailings (1998), and the construction of a groundwater interception system in the Metro Storm Drain (MSD) area. Treatability demonstration projects were conducted to evaluate the effectiveness of the LAO "treatment lagoons" for hydraulic control and treatment of contaminated groundwater, as well as to evaluate the effectiveness of storm water response actions on storm water runoff and the resulting water quality in receiving surface waters. Implementation of these response actions has resulted in the reclamation, removal, or stabilization of almost all major contaminant source areas and mine waste accumulations initially identified by the EPA at the BPSOU site. The response actions were in many cases undertaken to address the exceedances of arsenic or lead soil action levels at discrete locations within the BPSOU. Additionally, metals and arsenic contamination of surface water and groundwater and the resulting acute threat to the aquatic environment formed the basis for some of these actions.

Despite the past response actions completed at the site, site-wide remedial goals have yet to be achieved and significant risks still threaten human and environmental receptors. The potential exposure to lead and arsenic in residential soil and interior dust continue to pose a significant human health risk. Arsenic and metal contaminants in surface water and alluvial groundwater exceed applicable water quality standards and continue to affect aquatic life in Silver Bow Creek. The preferred remedy includes components to prevent or mitigate the remaining identified exposure pathways and to otherwise comply with applicable or relevant and appropriate cleanup standards (ARARs) and other remediation goals.

The following is a brief description of the TCRAs and the on-going ERAs undertaken within the BPSOU.

### **Time-Critical Removal Actions:**

- Walkerville (1988) - Addressed certain mine waste dumps and residential soil areas contaminated with lead >2,000 milligrams per kilogram (mg/kg) or mercury >10 mg/kg in Walkerville.
- Timber Butte (1989) - Removed and consolidated about 40,000 cubic yards of contaminated soil.
- Butte Priority Soils (1990 and 1991) - Addressed risks from certain mine waste dumps, a concentrate spill, and seven residential yards in Butte and Walkerville.
- Colorado Smelter (1992) - Removed and consolidated on-site about 40,000 cubic yards of mine waste.
- Anselmo Mine Yard and Late Acquisition/Silver Hill (1992) - Addressed a mine yard and several mine dumps in Butte.



- Walkerville II (1994) - Addressed four additional dump areas with elevated soil lead levels.
- Railroad Beds (ongoing, 1999 - essentially completed in 2004) - Is addressing railroad beds and adjacent residential yards that contain elevated concentrations of metals and arsenic.
- Storm Water (ongoing - begun in 1997) - Partially addresses storm water problems in Butte. Includes reclamation of the Alice Dump and removal of about 50 cubic yards of mercury-contaminated soils in the Dexter Street area.
- Walkerville (2000/2001) - The residential properties in Walkerville that had not been previously sampled were sampled and reclamation was conducted at specific residences where clean-up levels were exceeded.

## **Expedited Response (Non-Time Critical Response) Actions:**

- Lower Area One (ongoing) - Removed accessible mine tailings and contaminated soils from the Silver Bow Creek floodplain at the Colorado Tailings and Butte Reduction Works area and installed a groundwater interception and treatment system.
- Butte Priority Soils OU (Residential Soils/Source Areas (1994-Present)) - Partially addresses certain residential areas with soil-lead concentrations above the residential lead action level of 1,200 ppm. Under this action, EPA, DEQ, Butte-Silver Bow and the Atlantic Richfield Company (ARCO) integrated the removal of residential lead contaminated soils associated with mine-related wastes with the removal or mitigation of lead contaminants from non-superfund sources at certain residences. This provided Butte Silver Bow County (BSB) with funding and the flexibility to implement a comprehensive cleanup program. The BSB Lead Intervention and Abatement Program goal is to reduce the level of lead exposure incurred by children under 6 years old, pregnant women, and nursing mothers in a manner that results in long-term health benefits. Butte-Silver Bow's program targets all sources of lead, including interior and exterior lead based paint, interior lead dust, water and residential soils. The non-residential source area portion of this action included the remediation of areas that were above the lead action level of 2,300 ppm

## **Other Actions:**

- Lower Area One Manganese Removal (1992) - Removed manganese ore stockpiles in Lower Area One that were within the floodplain of Silver Bow Creek.
- Old Butte Landfill/ Clark Mill Tailings (1998) - Completed RCRA corrective action at the landfill in combination with Superfund removal actions. Removed about 800,000 cubic yards of the Colorado Tailings from Lower Area One and placed them in the repository constructed at this site



Principal threat wastes at the BPSOU site were addressed under these prior actions.

## **Selected Remedy**

The ROD for the BPSOU is the second ROD prepared within the Butte Portion of the Silver Bow Creek/Butte Area Site. The first ROD was for the Mine Flooding OU and addressed bedrock aquifer contamination and the Berkeley Pit area.

The Selected Remedy for the BPSOU addresses potential or actual threats to human health or welfare or the environment resulting from heavy metals and arsenic in soils, indoor dust, surface water and groundwater. The Selected Remedy incorporates many prior response actions done under removal or other authority. The Selected Remedy achieves the remedial action objectives established for the operable unit, is fully protective of human health and the environment, and meets or appropriately waives ARARs established for the BPSOU.

The Selected Remedy is a combination of comprehensive Alternative 4 from the FS and Alternative 2 of the Focused Feasibility Study for Metro Storm Drain, with modification. The Selected Remedy expands and modifies these alternatives in certain respects. The Selected Remedy expands the existing residential cleanup program to include lead, arsenic, and mercury contamination in the general population, not just in sensitive populations.

A technical impracticability evaluation has been prepared for the alluvial groundwater aquifer. It supports the waiver of ARARs for the alluvial groundwater aquifer and, if appropriate, for certain solid waste and floodplain ARARs for waste left in place in the Silver Bow Creek floodplain.

This cleanup will address potential and actual threats to human health or welfare or the environment from heavy metals and arsenic in high-volume, low-toxicity mine waste and contaminated soils in Butte. The Selected Remedy addresses contamination of surface water, groundwater, sediment, and storm water runoff caused by heavy metals and arsenic. The highlights of the Selected Remedy are presented for solid media, groundwater, and surface water below. A more detailed description and discussion of the Selected Remedy is presented in Section 12.



## Solid Media

### Residential Soils and Dust

EPA's action levels for residential soils and dust are:

**Table D-1**  
**Soil, Dust, and Vapor Action Levels**  
**Record of Decision**  
*Butte Priority Soils Operable Unit*  
*Silver Bow Creek/Butte Area NPL Site*

Contaminant of Concern	Exposure Scenario	Concentration
Lead	Residential	1,200 mg/kg
	Non-Residential	2,300 mg/kg
Arsenic	Residential	250 mg/kg
	Commercial	500 mg/kg
	Recreational	1,000 mg/kg
Mercury	Residential	147 mg/kg
	Residential (vapor)	0.43 µg/m <sup>3</sup>

Some residential areas above these levels have been addressed under prior removal actions, but many homes and residences have not. The BSB Lead Intervention and Abatement Program, described in Section 12.3.1.1, has been addressing certain residential areas (those homes or residences with children or pregnant women) in the manner described.

The Selected Remedy calls for the continuation and expansion of the BSB Lead Intervention and Abatement Program. The expansion of this program in the Selected Remedy requires that all residential properties within the BPSOU must be sampled and assessed and abated if action levels are exceeded, within a reasonable time frame, for arsenic, lead, and mercury. Abatement includes cleaning up yard soils, indoor dust, and attic dust as addressed below. Abatement can be done through the existing program, and can be integrated with the comprehensive abatement components of the program, which are already established.

If the Superfund remedial requirements are incorporated into the existing and expanded comprehensive program, a complete indoor and outdoor assessment (i.e., residential yard soil, indoor and outdoor dust, non-living space dust, lead-based paint, drinking water, and mercury vapor) of all residential properties that are known to be occupied or expected to be occupied must be completed within 8 years of the initiation of the expanded program. During this 8-year period, the clean-up of residential properties that exceed the actions levels will occur in concert with the assessment program. For those residential properties identified in the 8 year assessment program, the Selected Remedy requires the abatement activities be



completed as quickly as practicable, but no later than 15 years. The attic dust portion of the abatement program will continue thereafter.

Additionally, the program will ensure that all interior living spaces, including rentals, will be inspected to determine that attic dust is not entering living spaces. The regulatory agencies will evaluate the residential abatement program in 18 months, 36 months, and 5 years after the initiation of the expanded program. If these reviews show that the program is not protective of human health, the Agencies will modify the criteria that trigger the abatement of sources of attic dust contamination.

As noted, EPA's preference is for this program to be done in conjunction with the remediation of other lead and metal sources such as indoor plumbing, indoor lead based paint, and exterior lead based house paint, as is currently being done under the BSB Lead Intervention Program. This portion of the program, however, is outside of Superfund's statutory jurisdiction and must rely on voluntary cooperation from the potentially responsible parties, BSB, and the agencies to fund and implement this comprehensive approach. Under remedial design, EPA will work with these parties to develop a comprehensive program within the parameters described above. If an agreement can be reached between the responsible party (RP) Group and the EPA to address all pathways of exposure to lead, including lead-based paint, the Selected Remedy will include a Residential Metals Abatement Program to address lead, mercury and arsenic contamination in residential settings as described above and below.

A Residential Metals Abatement Program will expand the current BSB Lead Intervention and Abatement Program to include arsenic and mercury. The current Lead Intervention and Abatement Program focuses on properties with sensitive populations such as nursing mothers and children under age 6. The Residential Metals Abatement Program will also provide for a prioritized approach but is not limited to addressing only properties occupied by sensitive populations. The Residential Metals Abatement Program requires a multi-pathway approach to address lead, mercury, and arsenic contamination at all residential properties within the BPSOU. The program addresses all sources of arsenic, lead, and mercury in yards, household indoor dust, including dust in non-living space such as attics when an exposure pathway has been identified, interior and/or exterior lead paint, and lead solder in household drinking water pipes. It also includes sampling all residential properties within the BPSOU. Properties above the action levels for lead, arsenic and/or mercury will be remediated. Residential properties with sensitive populations as defined in the current Lead Intervention and Abatement Program will be addressed before those not occupied by sensitive populations.

Contaminated dust located in portions of homes that are seldom visited (non-living space areas) such as attics or crawl spaces will be remediated if an exposure pathway exists. Homes in Butte that are in areas adjacent to the BPSOU may have contaminated dust in the attics. Homes in these adjacent areas that have lead, arsenic, or mercury in attic dust will be addressed in the same manner as homes within the operable unit.



The Residential Metals Abatement Program will also require developing and implementing community awareness and educational programs in conjunction with a medical monitoring program.

If the comprehensive program cannot be achieved, the Selected Remedy requires a more rapid Superfund assessment and abatement program of all residential areas within the BPSOU Site. This program must address mercury, arsenic, and lead sampling for yards and indoor dust attributable in whole or in part to mine waste sources or yard contamination. Residential properties that have sensitive populations may be prioritized for remediation before properties that are occupied by non-sensitive populations, but all known or potential residences must be addressed within 3 years of the initiation of the expanded program. Community awareness and educational programs will be implemented. Homes in areas adjacent to the BPSOU that have lead, arsenic, or mercury in attic dust will be addressed in the same manner as homes within the operable unit.

#### ***Non-Residential Source Areas***

Contaminated solid media located in non-residential areas at the BPSOU include waste rock piles, milling wastes, smelter wastes, and contaminated soils.

Reclaimed areas, including cover soil caps, must achieve the proposed performance standards described by EPA in the Butte Reclamation Evaluation System, which is attached to the ROD as Appendix E. This system is a site-specific tool to evaluate the stability, integrity, and degree of human and environmental protectiveness afforded by EPA-sanctioned response actions, or other past reclamation action initiated on lands impacted by mining within the OU.

The Butte Reclamation Evaluation System establishes a system for evaluating reclaimed and revegetated land, relying on routine inspections to assess the:

- Condition and diversity of vegetative cover;
- Presence of erosion;
- Condition of site edges;
- Presence of exposed waste material;
- Presence of bulk soil failure or mass instability; and
- Presence of barren areas or gullies.

It also sets corrective action triggers for each parameter. Vegetated cover soil caps addressed under this ROD must support a diverse plant community including native species to the extent that the constituents of the vegetation cover are not incompatible with land use or sound engineering practices.



Sites with contaminated soil are grouped into different categories for remedial action:

1. Conditional, limited no further action sites
  2. Unreclaimed source areas exceeding arsenic and/or lead action level(s)
  3. Unreclaimed source areas not exceeding arsenic or lead action levels, but that impact surface water quality
  4. Previously reclaimed sites that were not addressed under EPA orders or actions
  5. Sites within the Granite Mountain Memorial Area
  6. Syndicate Pit
  7. Butte Mine Waste Repository
  8. Sites that were not granted a "conditional, limited no further action" status in the Response Action Summary Document
  9. Buried and/or saturated solid media in Lower Area One and Metro Storm Drain
- 
1. **Conditional, Limited No-Further Action Sites:** Areas of the OU that were reclaimed during previous cleanups and that were determined to have met standards and cleanup objectives in the Response Action Summary Document will require periodic assessments of reclamation conditions. Corrective actions will be taken as dictated by the Butte Reclamation Evaluation System. Separately, if the Surface Water Management Program determines additional remediation is needed, that work must also be done.
  2. **Unreclaimed Source Areas Exceeding Action Levels:** Very few unreclaimed source areas remain with arsenic or lead concentrations greater than human health risk action levels. Areas that do remain will be capped similar to prior actions – some removal may be necessary for contouring reasons. Remaining source areas at the OU that exceed the lead or arsenic action levels include:
    - Goldsmith Dumps Site 161
    - Arctic Site 1530
    - Wake Up Jim Site 1615<sup>1</sup>

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<sup>1</sup> This site will be addressed pursuant to the final design for the Granite Mountain Memorial Interpretive Area



- Small waste areas surrounding Clark Mill Tailings repository
- Caledonia Street
- Moose Dump Site 12

Also, any new source areas identified that exceed the risk-based action levels for lead and/or arsenic will be remediated.

3. **Unreclaimed Source Areas Not Exceeding Action Levels:** If an unreclaimed, disturbed site does not exceed lead or arsenic action levels, it may still be reclaimed because of contributions to storm water contamination. EPA, in consultation with the State, has determined that, at a minimum, the following list of sites will be addressed as an initial BMP effort under the Selected Remedy:

- Back Fill 007 Site 65
- Unnamed Dump Site 148
- New and Mahoney Street
- 413 Boardman Street
- Jenny Dell Site 33
- Kelley Mine Yard Entrance
- North Wyoming Street
- 800 North Main
- North Corner of Granite and Arizona
- Green Mountain Shaft<sup>2</sup>
- Streambanks, sediment and over bank deposits from and including the Blacktail Creek/Metro Storm Drain confluence area to Lower Area One
- 424 North Washington Street
- 131 West Copper Street

If it is demonstrated by the surface water monitoring and Surface Water Management Program that contaminants of concern (i.e., copper and zinc) from other areas are migrating and impacting surface water quality in Silver Bow

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<sup>2</sup> This site will be addressed pursuant to the final design for the Granite Mountain Memorial Interpretive Area



Creek, Blacktail Creek, or Grove Gulch Creek, to the extent that applicable water quality standards are exceeded, remedial actions for these areas will be implemented. The action to be implemented will be determined during remedial design, but will likely be capping with limited removal and reclamation.

4. **Previously Reclaimed Sites (Not Addressed Under EPA Order):** Sites where reclamation took place outside of removal actions mandated or performed by EPA will require sampling/ inspection and possible further reclamation, as necessary. Specific actions to be implemented will be determined during remedial design, but will likely be capping with limited removal. These sites shall also be evaluated and maintained over the long-term under the Butte Reclamation Evaluation System.
5. **Granite Mountain Memorial Area:** Various reclamation and other enhancements to the historic Granite Mountain Memorial Area shall be implemented. These include: reclaiming source areas in publicly used areas, restricting access to certain areas of the historic mining landscape, installing picnic areas and walking trails, enhancing existing vegetation, and diverting storm water runoff to the Berkeley Pit. These actions shall be consistent with historical preservation requirements and other standards and the county's historical park plan.
6. **Syndicate Pit:** The Syndicate Pit shall be reclaimed, to the extent practicable, for use as a mine training center. Shallow to moderate slopes will be reclaimed using soil caps, rock caps, and gravel parking areas. Steep slopes will not be reclaimed. The pit base will continue to be used as a sediment catch basin.
7. **Butte Mine Waste Repository:** When full, the existing Butte Mine Waste Repository will be closed in compliance with ARARs. A new repository will be sited next to the existing repository if that capacity is needed. It, too, would be closed using the same standards.
8. **Sites Not Granted "Conditional, Limited No Further Action" Status:** The following three sites were reclaimed during previous TCRAs or N-TCRAs and were determined NOT to meet ARARs and preliminary remedial action objectives (RAOs) in the Response Action Summary Document:

- Colorado Smelter

- Lower Railroad Yard Site 1

- Lower Area One

The Colorado Smelter site and Lower Railroad Yard Site 1 were not granted a conditional, limited no further action status in the Response Action Summary Document. EPA believes that the seasonal high water table may be less than 10 feet below ground surface at the Colorado Smelter. Therefore, capped wastes may violate solid waste requirements. However, this has not yet been clearly determined. For this reason, additional data must be collected to determine the



separation of the seasonal high water table from wastes at the Colorado Smelter. If it is determined that the separation between the base of wastes and the seasonal high water table is less than 10 feet, wastes will be removed to a designated repository. Wastes at the Lower Railroad Yard Site 1 will be removed to a designated repository.

The Selected Remedy for the Lower Area One site is described below in Groundwater Components.

9. **Buried and/or saturated solid media in Lower Area One and Metro Storm Drain:** The Selected Remedy for LAO and MSD is described in the Groundwater portion of the text.

## Groundwater

The Selected Remedy for groundwater will prevent ingestion of and direct contact with contaminated groundwater that would result in unacceptable risk to human health; prevent groundwater discharge that would lead to violations of surface water ARARs; and prevent degradation of groundwater that exceeds current standards. A Technical Impracticability evaluation was completed for the alluvial aquifer and determined that groundwater specific ARAR requirements cannot be met for the alluvial aquifer in a reasonable time frame. The Selected Remedy waives these ARARs in accordance with CERCLA.<sup>3</sup> The Selected Remedy for groundwater includes six components:

1. Existing contaminated saturated soils and mining waste will be left in place in Lower Area One and Metro Storm Drain.
2. Contaminated alluvial groundwater in the MSD shall be captured with the subdrain under the MSD channel, and/or another appropriate groundwater collection system. The captured groundwater shall continue to be pumped from the terminal vault in the MSD to the treatment facility at LAO. The captured and pumped water will be treated by lime precipitation technology as described below in subparagraph 4 before being discharged to Silver Bow Creek. However, because issues regarding long-term performance of the subdrain have not been fully addressed, the Selected Remedy also includes a 5-year shakedown period to evaluate the reliability of the MSD subdrain collection system. During this shakedown period, the system shall be evaluated and improved if needed, and an approved operation and maintenance plan shall be developed for the collection system. If the subdrain collection system shows significant performance issues, a

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<sup>3</sup> The Technical Impracticability ARAR waiver would also apply to the prohibition on the disposal or storage of tailings/mine wastes/toxic or hazardous materials in the floodplain to the extent that any part of the remedial action for wastes left in place in the floodplain would constitute the active management or storage of those wastes.



new or modified groundwater collection system will be designed and implemented.

3. Contaminated alluvial groundwater at LAO and base flow from Missoula Gulch will be intercepted in a hydraulic control channel, which runs parallel to Silver Bow Creek, and routed to the treatment lagoon facility described below. If groundwater inflow between the MSD and LAO capture systems is found to adversely affect surface water quality, additional groundwater capture and hydraulic control shall be implemented. In addition, water from the Mine Flooding OU West Camp System will be routed to the hydraulic control channel at Lower Area One for treatment in the treatment facility described below.
4. As part of the RI/FS, AR has constructed a lagoon treatment system at Lower Area One as a demonstration project. Treatment discharge data from this system suggest that it has been meeting state water quality standards for copper, cadmium, and zinc at the point of discharge. Arsenic standards have been met on all but a few occasions. These data are especially encouraging for cadmium discharges – conventional treatment systems have had problems meeting the cadmium standard because of reduced holding times in such facilities. The lagoon treatment system's longer holding times appear to be effective in the treatment of cadmium. Accordingly, the Selected Remedy includes retention and continued operation of the lagoon system, after evaluation and improvements determined during remedial design, for treating captured and routed groundwater prior to discharge to Silver Bow Creek. However, because issues regarding long-term performance and sludge removal and disposal for the treatment lagoon system have not been fully addressed to date, the Selected Remedy also includes the following:
  - a. A 5-year shakedown period will be in place for the lagoon treatment system. The captured groundwater will be treated to DEQ-7 standards (Table 8-2) prior to discharge. The lagoon treatment system must demonstrate successful water treatment and full compliance with the standards, when operating at designed capacity, and when operating under a wide range of conditions. Also, it must be demonstrated that sludge removal and sludge management can be performed effectively without causing system upsets. AR made modifications to expand the capacity of the treatment lagoons that did not go through the formal EPA design, review, and approval process. Therefore, those modifications and any additional design of the expanded treatment lagoon system will need to go through the formal EPA review and approval process. The lagoon treatment system shall be designed to prevent the release of untreated contaminated waters into Silver Bow Creek, as a result of upset periods due to flooding, equipment malfunction or failure, or extended periods of cold, etc. ARAR compliant sludge removal, management, and disposal plans must be developed and approved.



- b. Using the Butte Reduction Works area near the lagoon treatment system for sludge drying and sludge management is not allowed, since it is a dedicated open space area more suitable for public use.
  - c. If at any time during the shakedown period, or thereafter, the system fails to meet discharge standards and cannot be adjusted or modified to meet standards, or if sludge removal, management, and disposal cannot be done in compliance with ARARs and in a protective manner, a conventional lime treatment system shall be designed and built at LAO. The conventional system shall use lime treatment technology to treat the captured contaminated water and meet all discharge standards.
  - d. The design will be required to include contingencies for how to manage and store collected groundwater during extended periods of upset.
5. A comprehensive groundwater monitoring plan shall be prepared and implemented for the entire alluvial aquifer to ensure that groundwater capture systems are effective; to determine that contaminated groundwater is not leaving the TI Zone or discharging to surface water; to provide additional information as necessary on the movement, quality, and quantity of groundwater; and to provide data for review of the groundwater remedy. This monitoring system shall include expanded wells and measurements from the existing system, and shall provide for the careful and thorough monitoring that includes, but is not limited to, groundwater near Blacktail Creek, the groundwater between the MSD and LAO groundwater capture systems, groundwater adjacent to the lagoon treatment system, and groundwater downgradient (west) of the BPSOU. An initial outline of groundwater monitoring requirements is included in Section 12.
6. A controlled groundwater area shall be established for the alluvial aquifer to prevent domestic use of this water and to prevent any well development that would exacerbate or spread existing contamination. Other institutional controls, such as county laws or regulations regarding domestic use of groundwater in the area, may also be required.

The Selected Remedy for groundwater will be implemented primarily in the Metro Storm Drain and Lower Area One areas. Under the Selected Remedy, buried and partially saturated wastes in these areas will be left in place with appropriate groundwater monitoring and institutional controls (ICs). This will provide a continued understanding of the extent of groundwater contamination and long-term protection of human health and surface water resources.

Contaminated alluvial groundwater in the MSD will be captured and routed to a lime treatment facility for treatment and discharge to Silver Bow Creek, per the conditions described above. The groundwater collection system at MSD and LAO has and will significantly reduce the loading of metals to Silver Bow Creek. The groundwater remedy will provide the level of protection of Silver Bow Creek needed to achieve remedial action objectives during non-wet weather (base flow) conditions.



Although previous response actions have removed a substantial quantity of waste material from LAO, wastes remain beneath the Municipal Sewage Treatment Plant, structures such as the aqueduct and slag walls being retained for their historic value, and below the vertical excavation limits established during the design of the LAO Expedited Response Action (ERA). Existing hydraulic controls constructed during the LAO cleanup to capture, control, and extract contaminated alluvial groundwater and to prevent groundwater discharge to Silver Bow Creek are incorporated into the Selected Remedy. This system has operated since 1998 and, based on improvements in water quality in Silver Bow Creek, appears to be effectively capturing contaminated alluvial groundwater.

Under the Selected Remedy, groundwater captured in the interception and collection systems at LAO and MSD will be combined with contaminated base flow from Missoula Gulch and the groundwater from the West Camp bedrock system of the Mine Flooding OU for combined treatment in the treatment lagoon facility, to be evaluated and possibly re-designed or modified during remedial design (per the conditions described above). If monitoring data demonstrate that the current subdrain is not capturing the contaminated groundwater, or contaminated groundwater is leaving the site, or the system is not otherwise effective, additional groundwater capture systems and/or extraction wells will be implemented to ensure full effectiveness of the system. The treated water shall be subsequently discharged to Silver Bow Creek or used for other beneficial purposes. Treatment capacity for the lagoon treatment system will be evaluated and finalized during remedial design.

## Surface Water

The Selected Remedy for surface water is directed at achieving the primary objectives of returning Silver Bow Creek to its beneficial uses and protecting downstream receptors from releases of contamination from BPSOU. The Selected Remedy will protect human health and the environment, achieve water quality standards for COCs in Grove Gulch, Blacktail Creek and Silver Bow Creek, and meet all ARARs that are not waived. The Selected Remedy for surface water consists of the following components:

1. The Surface Water Management Program, which uses Best Management Practices (BMPs) to address contaminated storm water runoff and improve storm water quality.
2. Excavation and removal to a repository of contaminated sediments from the stream bed, banks, and adjacent floodplain along Blacktail Creek and Silver Bow Creek, from just above the confluence of Blacktail Creek and MSD to the beginning of the reconstructed Silver Bow Creek floodplain at LAO. The stream and floodplain will be reconstructed according to an EPA-approved design. Following removal of the in-stream sediments, further evaluation of surface water quality in this area will be conducted. If groundwater inflow is found to adversely affect surface water quality, additional hydraulic controls and groundwater capture shall be implemented.



3. Capturing and treating storm water runoff up to a specified maximum storm event, if BMPs implemented under the Surface Water Management Program do not achieve the goal of meeting surface water standards in Silver Bow Creek during storm water events.
4. Hydraulic control, capture, and treatment of contaminated groundwater to prevent its discharge to Silver Bow Creek surface water (as described in Section 12.3.2).
5. In-stream flow augmentation as appropriate. Flow augmentation will not be considered until the major remedial components described in this ROD are designed and implemented.

Hydraulic control, capture, and treatment of contaminated groundwater have largely addressed surface water contamination during base flow conditions. Storm water BMPs will be used to control storm water runoff from the OU and reduce the level of contamination of Silver Bow Creek, Blacktail Creek, and Grove Gulch from heavy metals and arsenic to below state water quality standards. The BMPs that will be implemented include, but are not limited to, actions such as source controls on mine wastes, engineered sediment controls, curb and gutters, detention/retention basins, routing storm flows away from receiving waters, or removal of waste materials to a repository. If BMPs are not effective in achieving surface water quality standards in Silver Bow Creek, lime treatment of storm water runoff may be required. Under this contingency, storm flows up to a specific design criterion would be collected and treated by lime treatment or redirected to the Berkeley Pit. If treatment is required, a conventional lime treatment plant dedicated for that purpose would be constructed.

The Selected Remedy permits augmenting stream flows by adding other water sources if necessary to increase flows and improve water quality. The objective of augmentation is to enhance the performance of other components of the surface water remedy and increase the probability of meeting surface water standards on a consistent basis within Silver Bow Creek. In-stream flow augmentation is subject to the conditions outlined above.

Elevated levels of arsenic and heavy metals occur in streambed sediments, the stream banks, and nearby floodplain materials from the confluence Metro Storm Drain and Blacktail Creek to the reconstructed Silver Bow Creek channel at LAO. To prevent these materials from being a source of contaminants to Silver Bow Creek, these materials shall be excavated and removed to an appropriate mine waste repository. The stream channel and floodplain shall then be reconstructed according to an EPA-approved design.

## **Institutional Controls**

The Selected Remedy includes the following minimum ICs:

1. A controlled groundwater area will be established in the Alluvial Aquifer TI Zone to prevent domestic use of contaminated water, exacerbation or spreading of



existing contamination, or release of highly contaminated groundwater to surface water resources through irrigation. The controlled groundwater area will prevent new well development, except for CERCLA monitoring wells, well systems that treat contaminated water prior to use, and the use of existing domestic and commercial wells. To the extent a controlled groundwater area will not prevent the use of existing wells, an education and well abandonment program will be implemented to persuade owners not to use contaminated water and to voluntarily take existing wells out of service in exchange, for example, for being hooked up to public water. An administrative entity will be identified to monitor and enforce these restrictions.

2. County zoning and permit requirements will be implemented to ensure that capped waste areas, discrete areas of waste left in place, and other control measures such as storm water controls are not disturbed, mismanaged, or inappropriately developed and that waste taken from these areas is disposed of at the Butte Mine Waste Repository, or if identified as a hazardous waste disposed of at a RCRA C facility. These controls and permits are best implemented with adequate funding for appropriate redevelopment and re-use of affected sites.
3. Deed notices will be required for all areas where wastes were capped and left in place or where engineered controls were constructed or other discrete wastes were left in place. The deed notices will notify current and subsequent landowners of the presence of these wastes or engineered controls and ensure that these wastes are not disturbed. In addition, fencing and signs may be required to ensure the integrity of caps and engineered controls.
4. Where private landowners require fencing or use posting for legitimate reasons relating to the prevention of remedy disruption, the Selected Remedy requires the installation of these fences or signs.

## **Operations and Maintenance**

There are several short-term Operation and Maintenance (O&M) plans in existence for various actions within the BPSOU site. The Selected Remedy requires the development of long-term and integrated comprehensive monitoring and O&M plans for all aspects of the Selected Remedy.

## **Statutory Determinations**

The Selected Remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, or appropriately waives ARAR requirements, is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on site above health-based levels that allow for unlimited use, a statutory review will be conducted within five years after initiation of remedial actions to ensure that the remedy is, or will be, protective of human health and the environment.



The Selected Remedy does not satisfy the statutory preference for treatment as a principal element of the remedy because feasible treatment options for solid media are not available for the waste and site conditions at the BPSOU. However, the remaining source materials in the BPSOU were determined to constitute a relatively low, long-term, non-principal threat, thus eliminating the need or expectation for treatment of solid media. Groundwater treatment, and an option to treat surface (storm) water if necessary, has been included in the Selected Remedy.

The Selected Remedy achieves substantial risk reduction and is feasible, implementable, and cost-effective. Residual risks are effectively managed under the Selected Remedy, as demonstrated by several years of experience at the OU with groundwater and cap management.

## **ROD Data Certification Checklist**

The following information is included in the Decision Summary section of this Record of Decision. Additional information can be found in the Administrative Record for this site.

- COCs and their respective concentrations.
- Baseline risk presented by the COCs.
- Cleanup levels established for COCs and the basis for these levels.
- How source materials are addressed and a classification of remaining source areas as non-principal threat wastes.
- Current and reasonably anticipated future land use assumptions, and potential future beneficial uses of groundwater used in the baseline risk assessments and ROD.
- Potential land and groundwater use that will be available at the site as a result of the Selected Remedy.
- Estimated capital costs, annual operation and maintenance costs, and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected.
- Key factors that led to selecting the remedy.



## Authorizing Signatures

The U.S. Environmental Protection Agency (EPA), as the Lead Agency for the BPSOU of the Silver Bow Creek/Butte Area Superfund Site (MTD980502777), formally authorizes this *Record of Decision*.



Max H. Dodson  
Assistant Regional Administrator  
Ecosystems Protection and Remediation  
U.S. Environmental Protection Agency, Region 8

9/21/06  
Date

The State of Montana Department of Environmental Quality (DEQ), as the Supporting Agency for the BPSOU of the Silver Bow Creek/Butte Area Superfund Site (MTD980502777), partially concurs with this *Record of Decision*. DEQ's Concurrence Letter is attached to this ROD as Appendix C.

Richard H. Oppen, Director  
State of Montana  
Department of Environmental Quality

Date



Declaration  
BPSOU Record of Decision

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## Authorizing Signatures

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\_\_\_\_\_  
Richard H. Oppen, Director  
State of Montana  
Department of Environmental Quality

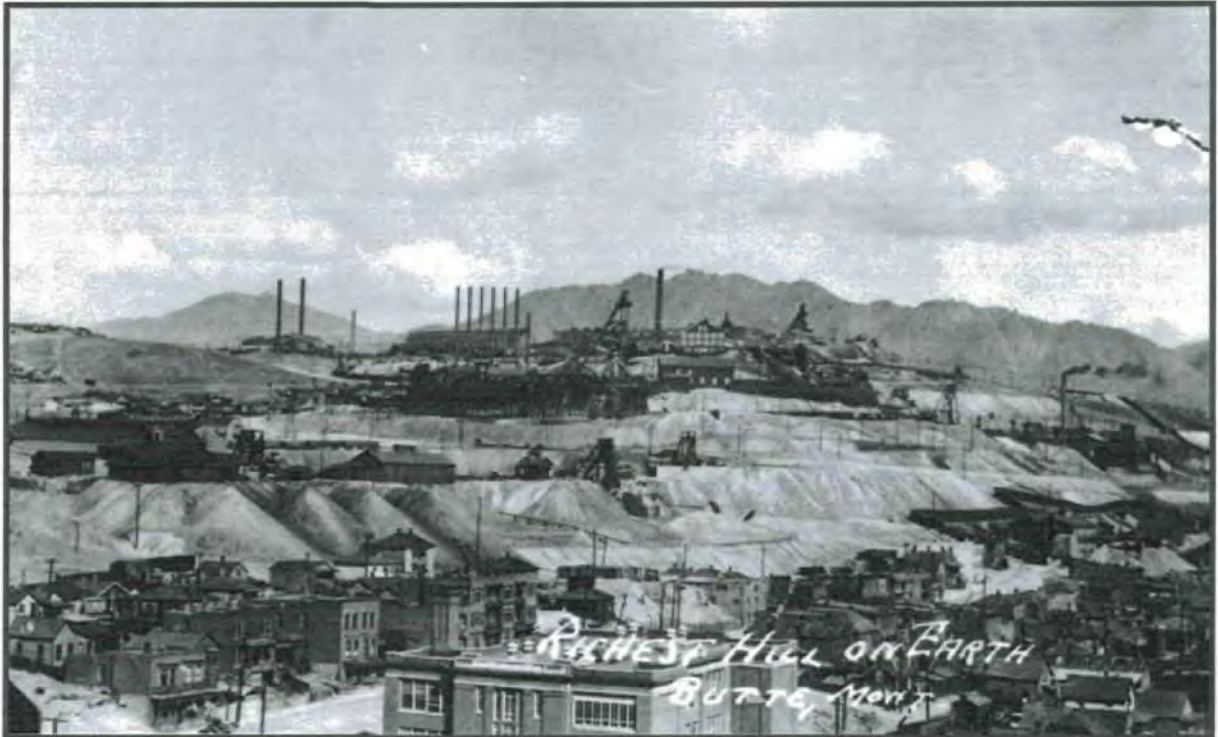
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**Record of Decision  
Butte Priority Soils Operable Unit  
Silver Bow Creek/Butte Area NPL Site**

U.S. Environmental Protection Agency, September 2006

**Part 2: Decision Summary**



***Decision Summary***



## Section 1 Site Name, Location, and Description

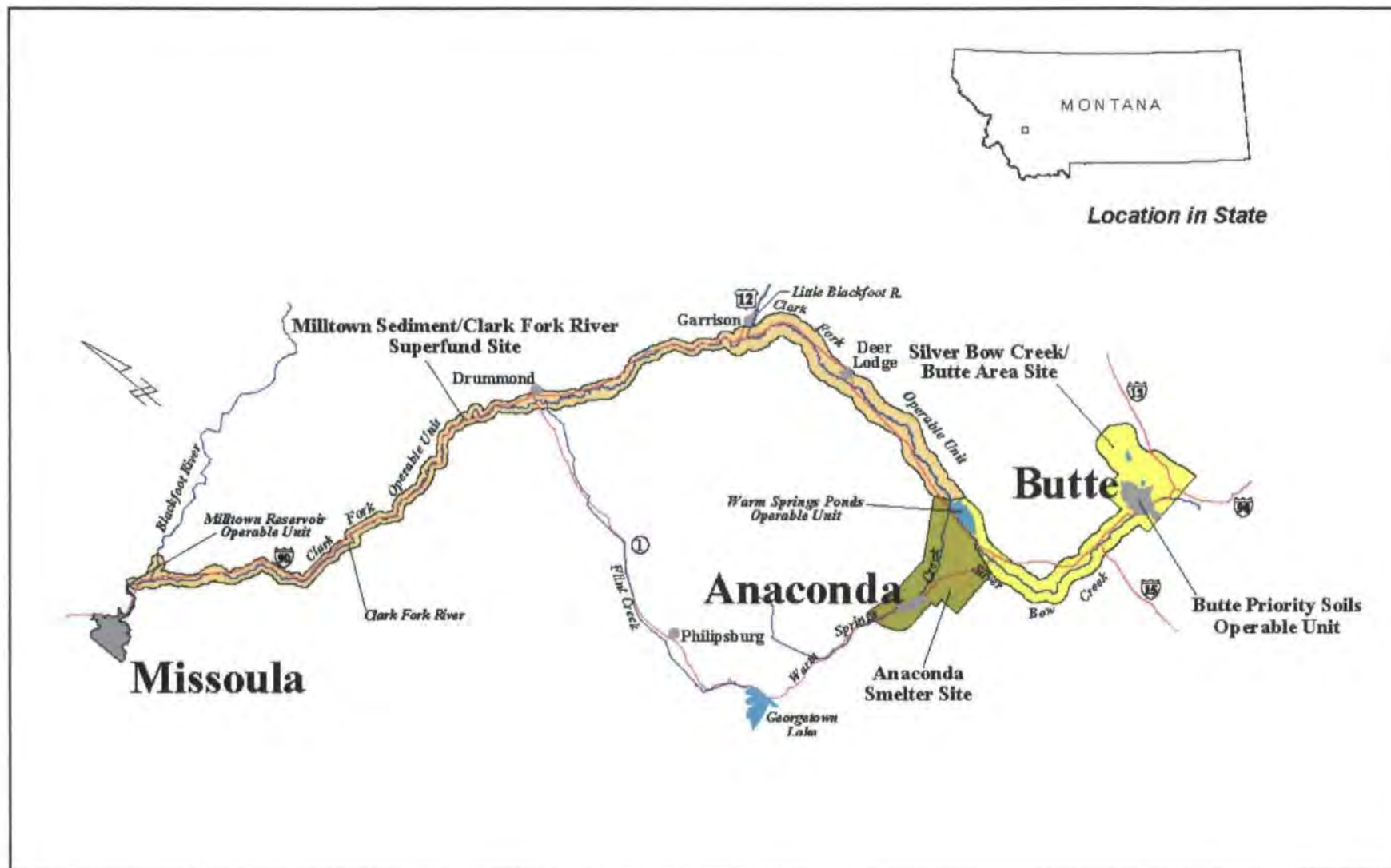
Butte Priority Soils Operable Unit (BPSOU)  
Silver Bow Creek/Butte Area Superfund Site  
Butte, Montana  
CERCLIS # MTD980502777

The Silver Bow Creek/Butte Area National Priorities List (NPL) Site, which includes the BPSOU, represents one of four contiguous Superfund Sites in the upper Clark Fork River Basin that extend 140 miles from the headwaters of Silver Bow Creek north of Butte to the Milltown Reservoir near Missoula, Montana (Figure 1-1). The Silver Bow Creek/Butte Area NPL Site lies immediately west of the continental divide in southwestern Montana, at the easternmost extent of the upper Clark Fork River drainage. The site encompasses approximately 85 square miles, including the entire length of Silver Bow Creek and associated land contamination from Butte westward approximately 25 miles to the Warm Springs Ponds near Anaconda. The site incorporates several square miles of land area within the city of Butte, Montana. The BPSOU lies within the Butte portion of the Silver Bow Creek/Butte Area site, encompassing the town of Walkerville, the part of Butte north of Silver Bow Creek and west of the Berkeley Pit, and a section of land that extends south from Silver Bow Creek to Timber Butte (Figure 1-2). The U.S. Environmental Protection Agency (EPA) is the lead agency and the Montana Department of Environmental Quality (DEQ) is the support agency for the BPSOU.

The BPSOU covers an area of approximately five square miles and is located a few miles west of the continental divide at an elevation range of approximately 5,400 to 6,400 feet above mean sea level (amsl). The BPSOU encompasses the northwestern portion of the Summit Valley, which is characterized by gently sloping terrain, generally sloping toward the north in the southern portion of the valley and toward the west in the northern portion of the valley. Mountains bound the valley on the east, south, and north with highest elevations reaching over 10,000 feet in the Highland Mountains south of Butte. The two primary streams in the valley are Blacktail Creek, which begins in the Highland Mountains to the south, and Silver Bow Creek, which begins where Blacktail Creek and the Metro Storm Drain (MSD) converge. Silver Bow Creek flows west along the base of the Butte Hill and, prior to mining, originated in the mountains northeast of the BPSOU. With the advent of mining, Silver Bow Creek was rerouted and the original channel and floodplain has been completely obliterated by the Berkeley Pit and the Yankee Doodle Tailings Pond. The MSD was constructed by realigning and filling the original Silver Bow Creek channel, a low-lying swampy area, with numerous mine waste impoundments. The Metro Storm Drain is generally dry, except during storm runoff or snowmelt episodes, and the primary source of flow in Silver Bow Creek is inflow from Blacktail Creek.



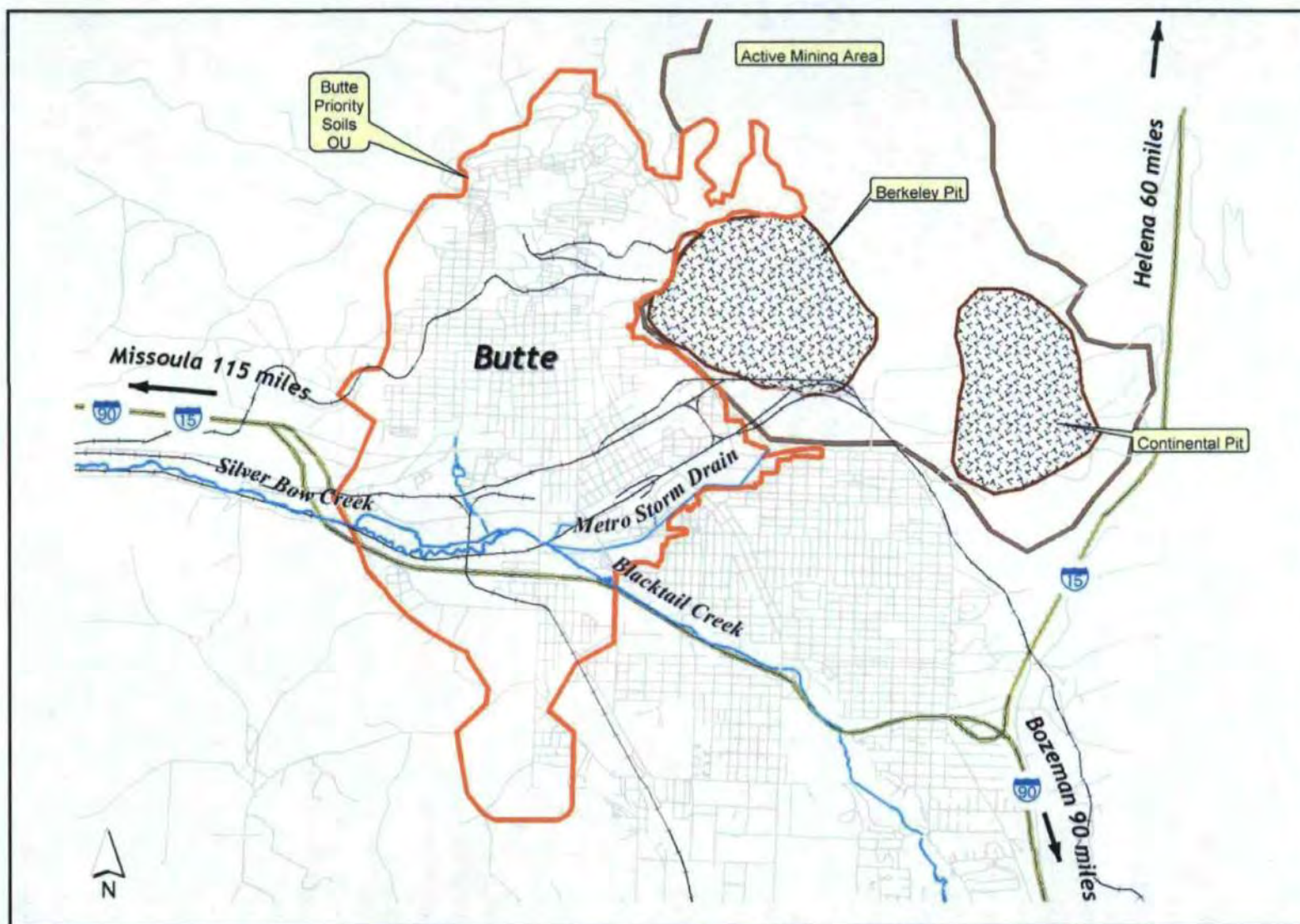
Section 1  
Site Name, Location, and Description



**Figure 1-1**  
**Site Location**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**







**Figure 1-2**  
**Butte Priority Soils OU Site Map**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**





*Section 1**Site Name, Location, and Description*

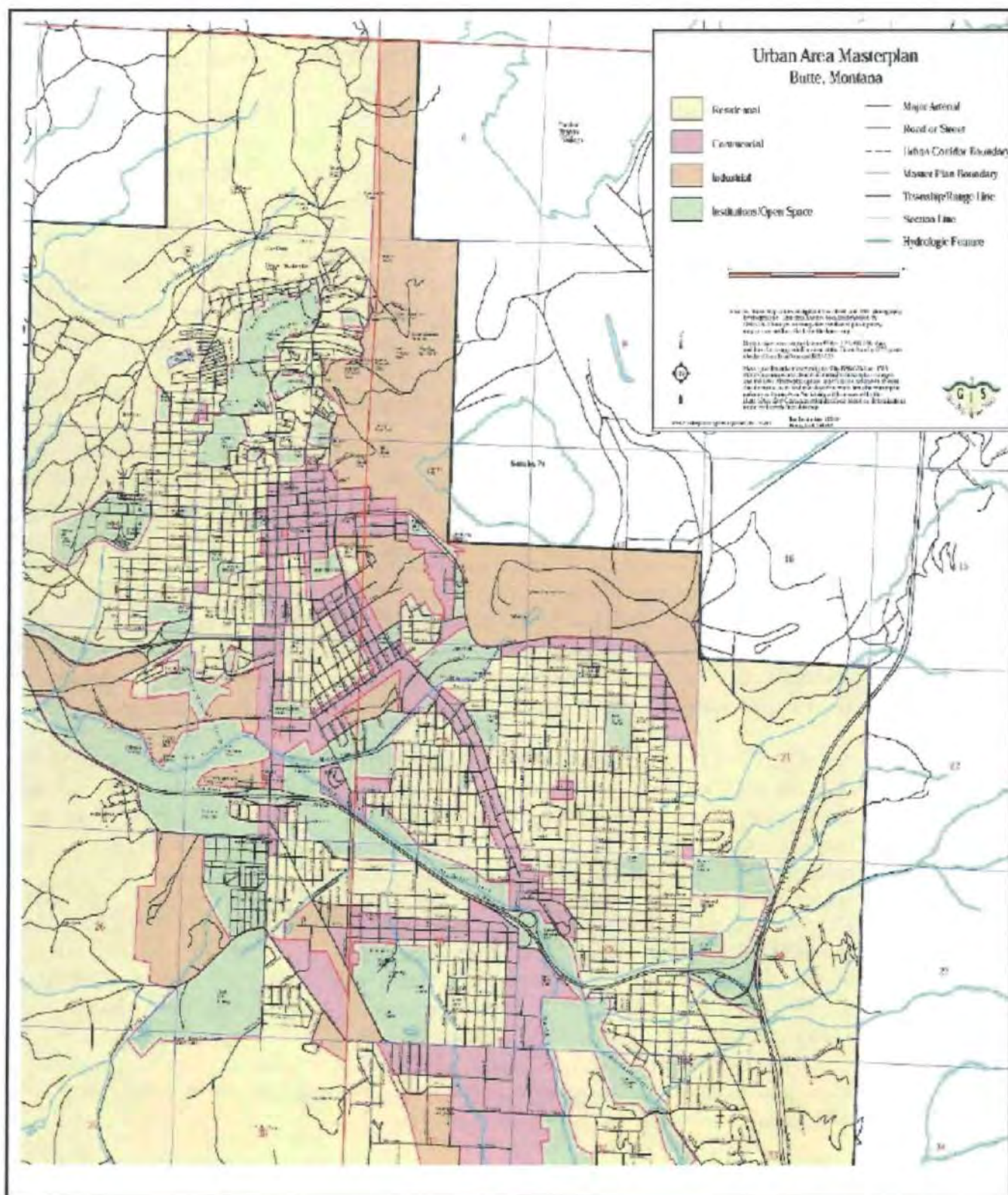
The BPSOU is centered on "Butte Hill", which is the location of the historic Butte Mining District. Contaminants at the site, including arsenic and heavy metals such as copper, lead, mercury, and zinc, are the result of 120 years of hard rock mining, smelting, milling, and other processing activities. Mining and ore-processing wastes in Butte represent the primary source materials. These wastes come in several different forms, including mill tailings, waste rock, slag, smelter fallout, and mixed combinations of each. Arsenic and metals contained in, or released from these wastes to soil, surface water, and groundwater pose significant risks to human and ecological receptors.

The BPSOU is situated in a predominantly urban setting, and includes residential neighborhoods, schools, and parks, as well as commercial and industrial areas. Land use within the BPSOU is subject to regulation by the Butte-Silver Bow (BSB) County government through local ordinances. Figure 1-3 is a map showing the major land uses in the BPSOU based on the BSB County Master Plan. The northern portion of the BPSOU is typified by residential and commercial development and inactive mining operations. Light industrial activity, scattered residences, and the Silver Bow Creek floodplain characterize the central portion of the BPSOU. The southern portion is characterized by residential areas, inactive mining operations, cemeteries, and undeveloped land. The estimated population of the city of Butte was 34,128 in 1994. The population of Butte peaked in 1920 at 60,313 people. The 2000 U.S. Census reports Butte's population to be 33,892.

Butte's continental climate is characterized by short, cool, dry summers and long, cold winters. The annual precipitation in Butte generally varies from 6 to 20 inches, with an average of nearly 13 inches. The greatest amount of precipitation, approximately one third of the annual amount, typically occurs during the months of May and June. With an estimated annual free water evaporation of 30 inches (NOAA 1988), annual evaporation significantly exceeds annual precipitation in the Butte area. However, precipitation amounts may exceed evaporation during certain portions of each year, given the cold climate in Butte. As a result, precipitation provides some recharge to groundwater systems in the BPSOU area.

The principal geologic units within the BPSOU are quartz monzonite bedrock overlain in places by alluvial deposits. Alluvium within the BPSOU is associated with Silver Bow Creek, Blacktail Creek, the MSD (i.e., the historic Silver Bow Creek floodplain), and Grove Gulch. The thickness of the alluvium is generally greater than 200 feet in the upper MSD area and decreases toward the west to less than 20 feet near the western BPSOU boundary. A water table depression associated with the Berkeley Pit has resulted in the formation of a groundwater divide in the alluvial groundwater system. The alluvial groundwater divide is located in the vicinity of the upper MSD and consists of an area with a relatively flat water table several hundred feet wide. Within the boundaries of the BPSOU, groundwater to the north and east of the divide flows toward the Berkeley Pit. Groundwater south and west of the divide generally flows parallel to the major drainages in the BPSOU.





**Figure 1-3**  
**Land Use within the BPSOU**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**





*Section 1**Site Name, Location, and Description*

Groundwater flow from the entire drainage converges in the west-central portion of the BPSOU in the area known as Lower Area One (LAO). Groundwater exits the west side of the BPSOU (and LAO) in a relatively narrow region of the flood plain alluvium associated with Silver Bow Creek. The alluvial deposits in this narrow region are less than 20 feet thick. The reduction in lateral extent and thickness of the alluvium near the west end of the BPSOU greatly decreases the cross-sectional flow area of the alluvial system, resulting in a "neck" through which only a very small portion of the alluvial groundwater can exit the basin. As a result, nearly all alluvial groundwater within the Summit Valley is forced to discharge to surface water in Blacktail Creek, the lower portion of the MSD, and to various groundwater control ponds and channels in LAO constructed as part of the LAO Expedited Response Action (ERA). This hydrogeological setting within LAO and the hydrologic modifications made as part of the LAO ERA has made it possible to control, collect and treat approximately 95 percent of the alluvial groundwater within the BPSOU.

EPA has implemented many response actions during the course of the RI/FS to address high priority human health and environmental risks, and these actions have reduced the severity of contaminant loading to Silver Bow Creek. Response actions completed to date have addressed over 8 million cubic yards of waste using removal, capping, and/or land reclamation. Over 400 acres of mine-impacted land on the Butte Hill have been reclaimed. Also, approximately 1.2 million cubic yards of tailings that were previously in contact with ground and surface water have been removed from the Silver Bow Creek floodplain. Storm water controls, including conveyance channels, diversions, and detention basins, have been constructed to significantly reduce contaminant loading carried from the Butte Hill via storm water runoff.

Through 2005, the PRP Group has spent approximately \$60 million associated with Superfund construction activities within the Butte Priority Soils OU. EPA has assessed the work completed under past response actions and has determined that, with the exception of three sites, the removal work is consistent with BPSOU site-specific remedial goals and ARARs and will not require further action.

Despite this progress, site-wide remedial goals have not been achieved, and threats to human health, public welfare, and the environment exist from heavy metals and arsenic. The actual or potential exposure to lead, mercury and arsenic in residential soil and interior household dust poses a significant human health risk. Arsenic and heavy metals in surface water and alluvial groundwater exceed applicable water quality standards. The Selected Remedy includes components to prevent or mitigate identified exposure pathways and potential threats to human health, public welfare and the environment.



## Section 2 Site History and Enforcement Activities

The Silver Bow Creek/Butte Area NPL Site is located in the upper Clark Fork River watershed and includes portions of Butte and Walkerville, Montana. EPA designated the original Silver Bow Creek Site as a Superfund site in September 1983, under the authority of the CERCLA. EPA expanded the Silver Bow Creek Site to include the Butte Area in 1987. In addition to the BPSOU, this NPL site also includes the following remedial OUs: Butte Mine Flooding Operable Unit ([BMFOU] - Berkeley Pit and flooded underground mine workings); Rocker Timber Framing and Treatment Plant; Streamside Tailings; Warm Springs Ponds Active Area; Warm Springs Pond Inactive Area; Active Mine Area; and West Side Soils (formerly Non-Priority Soils). Other Superfund sites within the Clark Fork River drainage include the Anaconda Smelter NPL Site, the Montana Pole and Treating Plant NPL Site, and the Milltown Reservoir/Clark Fork River NPL Site.

### *Site History*

In 1864, the first placer gold claims in the Butte area were staked and worked. These low-grade ores proved difficult to recover, and Butte remained a small mining camp compared to others in the region. Early activities focused on placer mining. However, silver and copper ore also attracted the attention of early miners.

By the 1870s, dozens of silver and copper claims had been located and successful treatment processes developed, prompting the construction of mills and smelters capable of refining arsenic-laden copper ores. A world-class copper industry began to develop. In 1881, the purchase of mining claims by future copper baron, Marcus Daly, marked a significant turning point for Butte. Daly and his financial partners organized various companies, which became the Anaconda Copper Mining Company (ACMC) and rapidly accumulated surrounding mining properties on the Butte Hill. At about this time, there were over 300 operating copper mines, at least 10 silver mines, five smelters, and over 4,000 posted claims. Many mining companies operated in the Butte area from the 1860s through the 1920s.

Butte's air quality was poor for many years because of heap roasting – a process in which copper ore was roasted in large, open air fires – and smelting that took place within the city limits. In response to the poor air quality, on December 17, 1890 the city passed Ordinance 186, which made it illegal to roast ore within the city limits.

In 1883, Daly developed his own smelting facility 25 miles away and established the town of Anaconda. In the early 1890s, Daly and the ACMC built their own railroad, the Butte, Anaconda & Pacific, thus monopolizing the mining, transportation, and smelting of the copper ore. Spurs of the mainline tied all of the ACMC mines on the Butte Hill to the smelter works in Anaconda.



By 1910, the Butte district had produced over 284 million pounds of copper, making it the largest producer of copper in North America. All of the mines produced waste piles of various compositions, and the mills and smelters produced large quantities of tailings and related waste that were disposed of in ponds or dumped in Silver Bow Creek. Between 1910 and 1927, ACMC completed consolidation, with few exceptions, of all of the major mines, smelters, and mills in Butte. Milling and smelting continued in Butte until the 1920s but, as the copper smelting capacity at Anaconda grew, Butte became primarily a mining center. Butte's smelters and mills produced air emissions that contaminated yards and attics throughout the BPSOU, as well as large quantities of waste such as tailings and slag. Butte's mines also produced waste and overburden piles throughout Walkerville and Butte.

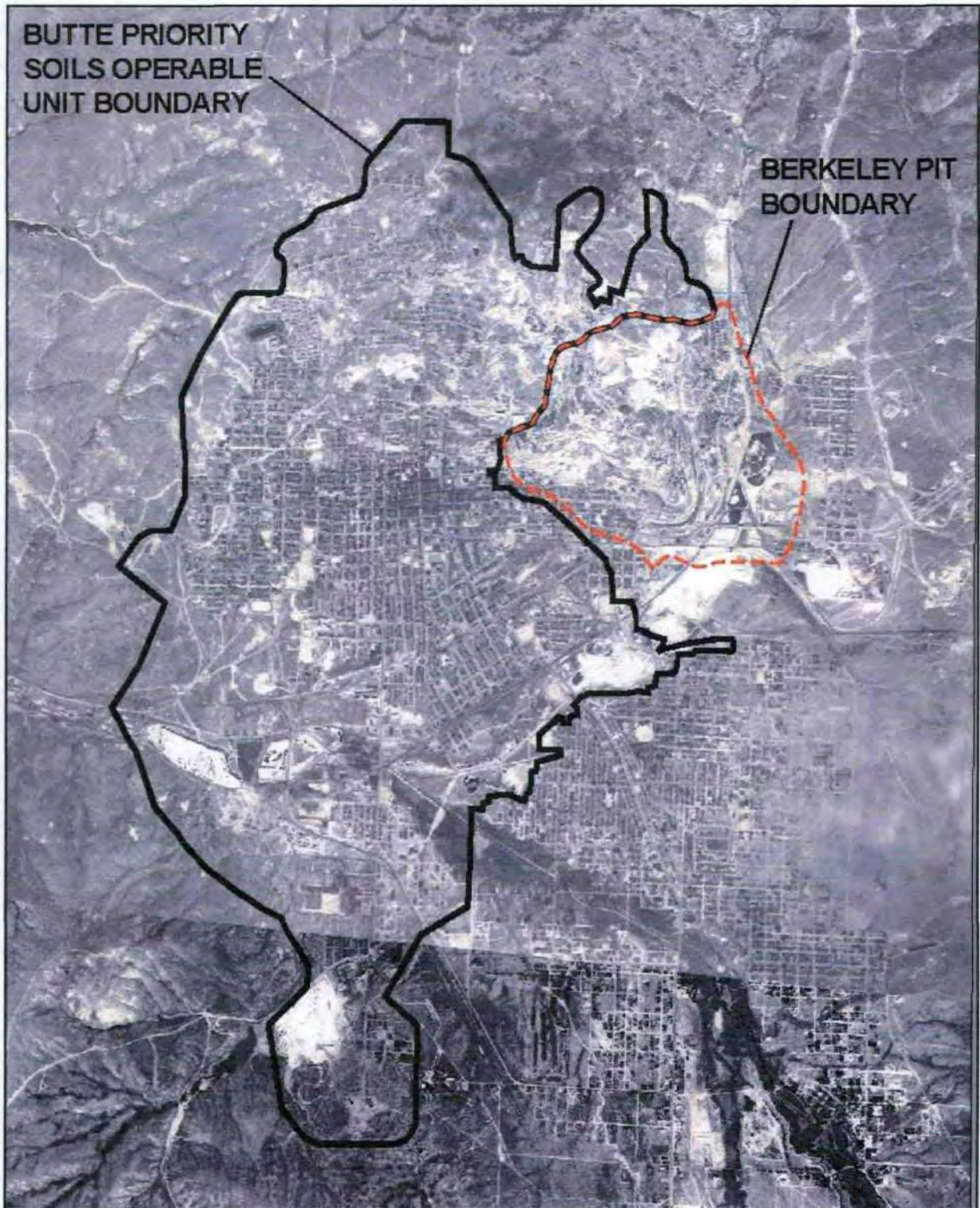
Mining in Butte was entirely underground until 1955, when ACMC began surface mining at the Berkeley Pit. Figure 2-1 shows the mining landscape in Butte at the beginning of the open pit mining era.

For 80 years, immense quantities of low-grade ore were moved from the Berkeley Pit to Anaconda. But in the 1960s and early 1970s, significant changes were made in the mining and processing procedures. The completion of the Weed Concentrator in Butte in 1964 reduced the amount of ore sent to Anaconda from 12 to just one trainload per day. The Weed Concentrator (now known as the Montana Resources Concentrator) was an ore concentrating facility that produced large quantities of waste in the active mine area and discharged large volumes of contaminated water to the Metro Storm Drain.

In 1977, ACMC merged with ARCO. Open pit mining operations were conducted in the Berkeley Pit until 1982 and in the Continental Pit until 1983 when all mining operations were suspended by ARCO, the successor to ACMC. In 1985, certain properties were sold to Dennis Washington, owner of the Montana Resources (MR) Company. MR is the current operator of surface mining operations in the Continental Pit, which is located east of the Berkeley Pit, and the MR Concentrator (formerly known as the Weed Concentrator). ARCO closed the Anaconda Smelter in 1984. ARCO is now known as Atlantic Richfield, and is a wholly owned subsidiary of British Petroleum.

More than 120 years of mining has created numerous waste rock dumps that are scattered throughout the Butte area. Operation of mills, concentrators, and smelters generated tailings and a variety of other materials. The City of Butte and the Town of Walkerville were established with the advent of mining in the area and grew in size and population as the mining and milling industries flourished. The communities were established close to the mining and milling centers as a matter of convenience. Urbanization of Butte Hill and paving of large areas increased storm water runoff relative to pre-urbanization levels. Railroads were used to transport the ore and ore concentrate. Some railroad grades were built using mine waste rock, fill, and other readily available materials.





**Figure 2-1**  
**Beginning of Butte Open Pit Mining Era**  
**(1954-1956)**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**





Beginning in 1881, several railroads have served Butte, including the Union Pacific Railroad; Northern Pacific Railway and the Great Northern Railway (now The Burlington Northern and Santa Fe Railway Company); the Butte, Anaconda and Pacific Railroad; the Milwaukee Road (also known as the Chicago, Milwaukee, St. Paul and Pacific Railroad); the Montana Western Railway; and the Rarus Railway (Rarus). Remaining rail lines in the BPSOU area are shown on Figure 2-2.

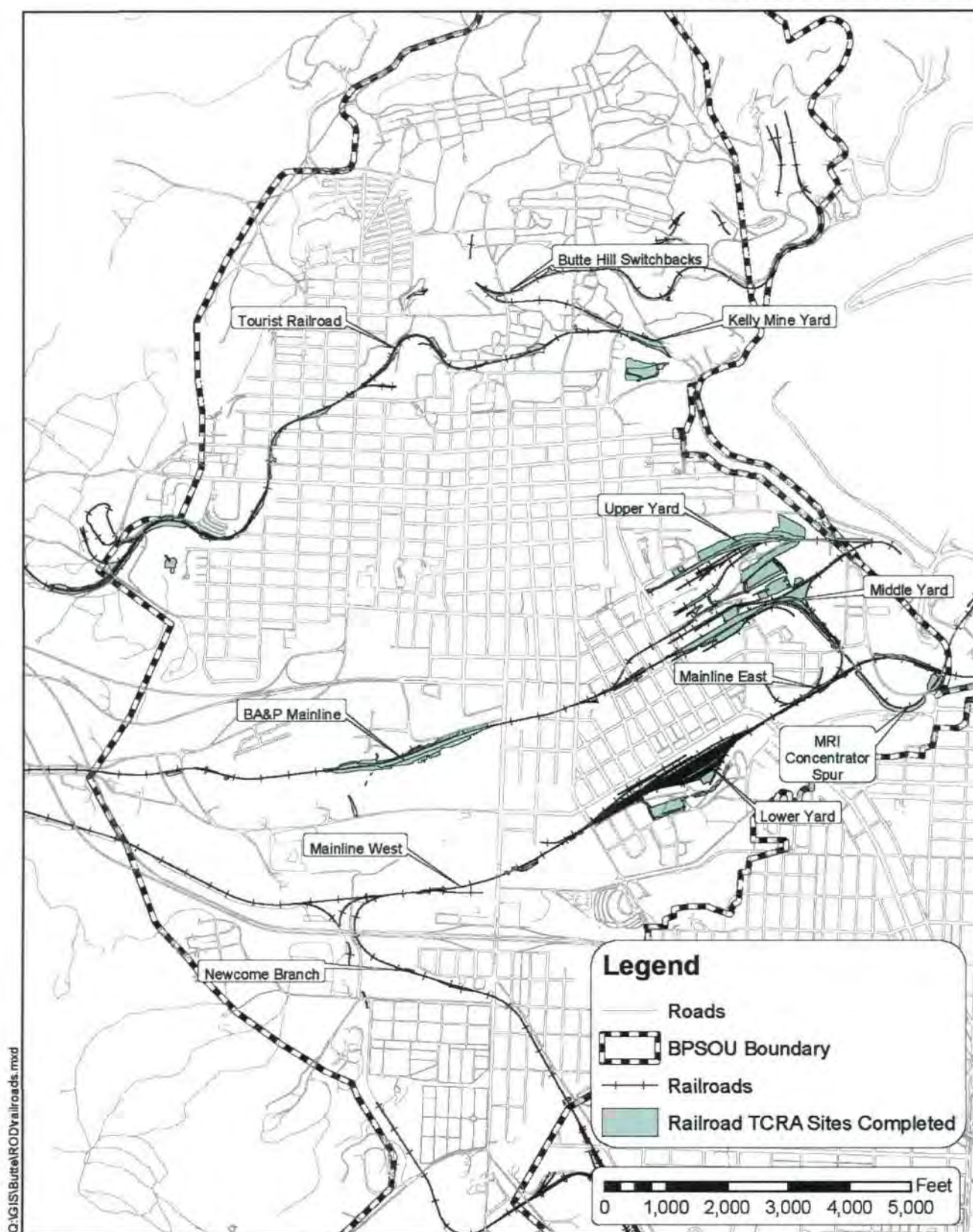
### *Enforcement Activities*

EPA designated the original Silver Bow Creek Site as a Superfund site in September 1983. A fund lead RI for Silver Bow Creek was started in 1984. During the course of this initial RI, the importance of Butte as a source of contamination to Silver Bow Creek was formally recognized. Preliminary results from the Silver Bow Creek RI indicated that upstream sources (i.e., ubiquitous mining-related wastes throughout Butte) were partly responsible for the contamination observed in the creek. After a thorough analysis of the relationship between the two sites (Butte and Silver Bow Creek), EPA concluded that they should be treated as one site under CERCLA. EPA subsequently modified the existing Silver Bow Creek Site to include the Butte area and the formal name was changed to the "Silver Bow Creek/Butte Area NPL Site" in 1987. The BPSOU was one of four remedial OUs formed in the Butte Area.

A list of PRPs is provided in Appendix D. Following issuance of this ROD, EPA will reexamine and update this list. Many of the original PRPs are no longer in existence. The new Anaconda Company has purchased Ferry Lane, one of the PRPs. EPA settled with Montana Power Company in October 2000 for its liability share within the Butte Priority Soils OU. EPA will consider settlement discussions with other small parties, separate from the main Remedial Design/Remedial Action Consent Decree. The main PRPs who are likely to participate in the final Consent Decree are ARCO, Butte-Silver Bow County, Burlington Northern Santa Fe Railroad, Union Pacific Railroad Company, and Montana Resources, Inc. and its related entities.

In 1987, the Butte Soils Screening Study (CDM 1988) was conducted to provide EPA with site characterization data for the purpose of prioritizing future Remedial Investigation/Feasibility Studies (RI/FS) and removal activities. In 1989, EPA separated the BPSOU into Phase I and Phase II activities to be implemented concurrently. Phase I activities focused on high-priority human health risks and resulted in the implementation of numerous TCRA's and ERAs (discussed in additional detail previously and below). These activities have included physical removal and/or capping of the majority of potential arsenic and lead source areas within, or close to, residential neighborhoods (e.g., waste rock dumps, railroad beds, residential yards, and play areas) and cleanup of many yards. Phase II activities included conducting the full RI/FS for the entire OU. The emphasis of Phase II was an evaluation of arsenic and metal concentrations and pathways relating to Silver Bow Creek and alluvial groundwater, and both present and future arsenic and metals concentrations and pathways relating to source materials located outside of residential areas.





**Figure 2-2: Butte Railroads and Sites Addressed in the Railroad TCRA**  
Record of Decision  
Butte Priority Soils Operable Unit  
Silver Bow Creek/Butte Area NPL Site





*Section 2**Site History and Enforcement Actions*

In 1991, following initial data collection activities, EPA developed the Statement of Work (SOW) for the Phase II RI/FS (EPA 1991). The SOW served as the substantive basis for the Phase II RI/FS Work Plan (PRP Group 1996). A consent order to conduct a RI/FS at the BPSOU was executed by EPA and signed by ARCO and other BPSOU PRPs in June 1992.

*Site Characterization Background*

The soil/mine waste, air, surface water, and groundwater media of the BPSOU have been the subjects of studies since the late 1960s. The pace of study picked up considerably after the area became listed on the NPL in 1983. Tables 2-1, 2-2, and 2-3 summarize the soil, surface water, sediment, and groundwater investigations used to prepare the BPSOU RI and FS reports. As shown in Table 2-1, numerous investigations concerning surface soil and surface mine waste were conducted to examine the chemical characteristics of soil within residential and commercial areas, mine waste rock dumps, tailings accumulations, and railroad grades within the BPSOU. The surface water system within and adjacent to the BPSOU has been characterized by the investigations shown in Table 2-2. Both alluvial and bedrock water-bearing units are present within the Silver Bow Creek/Butte Area NPL Site. The BPSOU RI Report and subsequent documents primarily characterized the alluvial aquifer, since the bedrock aquifer was addressed in the Mine Flooding OU. Groundwater investigations are shown in Table 2-3.

Air quality within the BPSOU has been monitored with regard to total suspended particulates and metals concentrations. The majority of the data identified are linked to permitting requirements for the active mining/milling areas. As discussed in Section 3.1 of the RI report, the airborne transport of COC bearing particulates within the BPSOU does not pose a significant threat to human health and, therefore, additional efforts to characterize the air pathway were not undertaken in connection with the RI.

The PRP Group was responsible for developing the Phase II RI/FS work plan, the RI/FS reports and most of the associated sampling and analysis plans, laboratory analytical protocols, site health and safety plans, data reports, and technical memoranda supporting the RI/FS. All reports were reviewed and approved by EPA, in consultation with DEQ. EPA, in consultation with DEQ, prepared human health and ecological risk assessments, the community involvement plan, the Focused Feasibility Study of the Metro Storm Drain, and identified ARARs for the BPSOU site. In consultation with DEQ, EPA prepared the Proposed Plan and this ROD. Following issuance of the ROD, EPA and ARCO, along with other parties, are subject to a court order for mandatory Consent Decree negotiations.

*Summary of BPSOU Response Actions*

As noted previously, EPA undertook several removal actions (TCRAs and ERAs) within the Butte Priority Soils OU. Virtually all of this work was done by the PRPs under unilateral or administrative consent orders. Prior to the final FS and remedial decision process, 422 acres of land within the Butte Priority Soils OU have undergone



**Table 2-1**  
**Summary of Previous Soils Investigations**

**Record of Decision**  
*Butte Priority Soils Operable Unit*  
*Silver Bow Creek/Butte Area NPL Site*

Reference	Surface Soil/Mine Waste Summary	Types of Soil/Mine Waste Information Collected	Number of Samples within the BPSOU Surface Soils Database	Analytes
Ecology and Environment, 1987. Data Results for Walkerville, Silver Bow County, Montana, letter report to Michael Holmes of EPA from Kenton Alexander of Ecology and Environment, Inc. March 11, 1987.	Surface soil sampling in Walkerville at waste dumps, drainages, residential yards, etc. Data from this investigation was not included in the soil database (Appendix A) due to incomplete sample location information.	Surface soil sampling with 611 samples	NA	542 samples - As, Cd, Cr, Cu, Hg, Pb, Mn, Zn & pH 69 samples - Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Na, Ni, Pb, Sb, Se, Sn, Ti, V, & Zn
AMC, 1987. Butte/Centerville Soil Sampling Project Report, Prepared by Tetra Tech, Inc. April 1987. BUTS087C	Sampled bare surface soil in public areas where children are likely to play: parks, schools, ball fields, ice rinks, motocross racing areas, day care centers and rodeo grounds. One composite sample from each area was collected and generally consisted of several subsamples.	Surface soil sampling of bare soil in public areas	50 plus 2 duplicates	As, Cd, Cu, Hg, Pb, Zn, pH, & percent moisture
CDM, 1988. Final Report, Butte Soils Screening Study (BSSS) for the Butte Addition to the Silver Bow Creek NPL Site, Butte, Montana, Prepared for EPA. BUTS087A	A comprehensive soils screening study to provide analytical data for prioritizing future RI/FS activities. Measured soil concentrations at historic mining and processing sites as well as residential and public areas.	Surface soil sampling, soil profile sampling	367 plus 19 duplicates	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Na, Ni, Pb, Sb, Se, Sn, Ti, V, & Zn
Ecology and Environment, 1988. Data Validation Results from the Walkerville Removal Action, letter report to Mike Holmes of EPA from Karen Abbenhaus of Ecology and Environment, Inc. October 25, 1988.	Surface soil sampling in Walkerville at residences, ball fields, waste rock piles, etc. Data from this investigation was not included in the soil database (Appendix A) due to incomplete sample location information.	Surface soil sampling with 225 samples	NA	Hg, Pb, pH, & porosity
CH2M Hill and Chen-Northem, 1990a. Draft Final Silver Bow Creek CERCLA Phase II Remedial Investigation Summary, Area 1 Operable Unit. BUTSD89A BUTGV89A	Filled in data gaps of Phase I RI (MultiTech, 1987). Conducted soils mapping, sampling of soils and dispersed tailings and sampling of impounded tailings deposits in the Area One Operable Unit.	Surface soil sampling, lithology, metals by grain size and mapping; subsurface soil sampling	105 plus 9 duplicates 73 additional XRF	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Na, Ni, Pb, Sb, Se, Ti, V, & Zn
Ecology and Environment Inc., 1990b. Report of Sampling Activities, Butte Priority Soils, Butte, Montana, March 1, 1990. BUTS090B	Determined if elevated metals existed in waste rock piles included in the Butte Priority Soils Removal Action.	Surface soil sampling	35	As, Cd, Cu, Pb, Zn & pH
ARCO, 1991a. Butte Priority Soils Investigation, Prepared by PTI Environmental Services, February 1991. BUTS091D	Helped fill data gaps from CDM (1988) (BSSS). Collected soil samples from 560 residential yards and analyzed for metals.	Surface soil sampling of residential yards	45 CLP data only	As, Cu, Pb & Zn
BSB Department of Health and Univ. of Cincinnati, 1991. The Butte-Silver Bow Environmental Health Lead Study. BUTS091E	650 soil samples were taken in residential yards, gardens, and play areas to help identify and quantify accessible metals in the environment. Performed a blood lead study for children under six years of age.	Surface soil sampling	532	As, Cd, & Pb
CDM, 1991. Priority Soils Railroad Data, Letter to Sara Weinstock of EPA from Robert Rennick of CDM Federal, June 17, 1991. BUTS091A	Characterized metals and arsenic concentrations in designated railroad grades within the BPSOU.	Railroad grade sampling	51 plus 3 duplicates	Al, As, Cd, Cu, Cr, Fe, Pb, Mg, Ni, Zn, pH, & EC



**Table 2-1**  
**Summary of Previous Soils Investigations**

Record of Decision  
Butte Priority Soils Operable Unit  
Silver Bow Creek/Butte Area NPL Site

Reference	Surface Soil/Mine Waste Summary	Types of Soil/Mine Waste Information Collected	Number of Samples within the BPSOU Surface Soils Database	Analytes
ARCO, 1992h. Anaconda Long Term Vegetation Monitoring Project, 1988-1990, Smelter and Butte Hill Sites. Prepared by W. Keammerer, D. Arthur, and A. Kuensling. CFUS088A	Evaluated revegetation success at reclaimed areas in Butte and Smelter Hill near Anaconda. Characterized existing vegetation and metals concentrations in upper soil layers and plant tissues to help evaluate long term stability of vegetation. Data from this investigation was not included in the soil database because samples of remedial cover soils, not mine waste.	Surface soil sampling, vegetation structure and composition	NA	Al, As, B, Ba, Cd, Cr, Cu, Fe, K, Mg, Mn, Mo, Na, Ni, P, Pb, Si, Sr, Ti, V, Zn, pH, SAR, TOC, & CEC
CDM, 1992a. Buffalo Gulch Drainage/Residential Yards Sampling Photographs, Letter to Sara Weinstock of EPA from Gregg R. Monger of CDM Federal, July 14, 1992.	Characterized metals and arsenic concentrations in sub-surface soil samples within source areas within the Buffalo Gulch Drainage and surface soil samples from five selected residential properties within BPSOU.	Surface and sub-surface soil sampling	5 Residential yard data only	As, Cd, Cu, Pb, Zn, pH, & EC
Ecology and Environment Inc., 1992. Report of Sampling Activities Anselmo/Late Acquisition Removal Areas, Butte, MT. BUTS092C	Collected surface soil samples at the Anselmo Mine Yard Removal Area and the Late Acquisition Removal Area. Results used to fill data gaps in determining boundaries of materials to be removed by PRPs.	Surface soil sampling	8	As, Pb, & pH
MSE, Inc., 1992. Final Field Sampling Report, ARCO Priority Soils Investigation. BUTS092B	Sampled 37 residential yards for metal analyses. One composite sample from each yard was collected and consisted of 2 to 16 subsamples.	Surface soil sampling of residential yards	46 plus 3 duplicates	As, Cd, Cu, Pb & Zn
ARCO, 1993c. 1991 DS/DV/DU Report, Colorado Tailings and Butte Reduction Works Soils Investigation, Lower Area One Expedited Response Action, Supplemental Investigations, Silver Bow Creek/Butte Area NPL Site. BUTS091B	Determined areal extent of mine tailings and metals-impacted soils and mapped surface debris within Lower Area One.	Mapped surface debris and performed surface soil sampling with LAO.	5	As, Cu, Pb, Zn, & Organics
CDM, 1993. July 1993 TCRA Sampling Results, Letter to Sara Weinstock of EPA from Darrel Stordahl of CDM, August 12, 1993. BUTS093A	Collected soil samples from the Alice Dump, Anselmo Mine Yard area, and fill material stockpiled at Lower Area One.	Soil and fill material sampling	27 plus 1 duplicate	As, Cu, Pb, Zn, and pH
AGI, 1994. Railbed Assessment, BPSOU. BUTS093B	Evaluated metals concentrations in railroads owned or leased by BNRR, UPRR, and MWRC within the BPSOU.	Surface and sub-surface samples of railbed materials. SPLP leach tests.	154 plus 6 duplicates	As, Cu, Pb, & Zn A few samples had: Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Na, Ni, Pb, Sb, Se, Ti, V, & Zn
CDM, 1994a. BPSOU January 1994 Soil Sampling Results, Missoula Gulch-Emma Dump, Letter to Sara Weinstock of EPA from Darrel Stordahl of CDM, February 14, 1994. BUTS094B	Collected surface soil samples from the North Emma Dump and the vacant area to the north of this dump.	Surface soil sampling	13 plus 1 duplicate	As, Cd, Cu, Pb, Zn, & pH
CDM, 1994b. BPSOU April 1994 Soil Sampling, Source Areas Sampling Results, Letter to Sara Weinstock of EPA from Darrel Stordahl of CDM, May 26, 1994. BUTS094C	Sampled waste rock dumps and other mining-related areas to determine if they would be added to the BPSOU ERA Source Areas SOW for removal.	Surface soil sampling	27 plus 2 duplicates	As, Cd, Cu, Pb, Zn, & pH



**Table 2-1**  
**Summary of Previous Soils Investigations**

**Record of Decision**  
*Butte Priority Soils Operable Unit*  
*Silver Bow Creek/Butte Area NPL Site*

Reference	Surface Soil/Mine Waste Summary	Types of Soil/Mine Waste Information Collected	Number of Samples within the BPSOU Surface Soils Database	Analytes
AGI, 1995. October 1994 Supplemental Soil Sampling, Railbed Assessment, BPSOU. BUTS094D	Collected soil samples to confirm metals concentrations in railbed at the western extremity of BPSOU and the rail bed on the Newcome Branch. Data from this investigation was not included in the soil database (Appendix A) because samples taken from material which was removed as part of the Montana Pole Site remediation.	Surface and sub-surface sampling	NA	As, Pb
CDM, 1995. BPSOU November 1994 Soil Sampling Results, Letter to Sara Weinstock of EPA from Darrel Stordahl of CDM, January 26, 1995. BUTS094A	Collected surface soil samples from waste rock dumps and other mining-related areas to determine metals and arsenic concentrations as part of BPSOU ERA activities.	Surface soil sampling	30 plus 2 duplicates	As, Cd, Cu, Pb, Zn, & pH
URS Operating Services, Inc., 1997. Trip Report for Removal Support, Alice Dump, Butte/Walkerville, Montana.	Collected surface soil samples from the Alice Dump to determine metals and arsenic concentrations.	Surface soil sampling	96 plus 9 XRF results for samples with CLP results	As, Co, Cu, Pb, Hg, & Zn
CDM, 1998. Data Summary Report for Stream-Sediment and Soil Sampling in Grove Gulch, Blacktail Creek, and Silver Bow Creek Diversion Channel, BPSOU. BUTS097A	Collected surface soil samples adjacent to Grove Gulch. Sampled materials that resembled mine wastes or had little to no vegetation cover.	Surface soil sampling	10 plus 1 duplicate	As, Cd, Cu, Pb, Zn, & pH
ARCO, 2000a. Data Summary Report, Railroad Bed Time Critical Removal Action, Supplemental Railroad Bed Sampling Program. RRTCRA	Performed sampling of railroad bed material and adjacent residential yards to further define the extent of railroad beds and yards to be addressed by the Railroad Bed TCRA.	Surface soil sampling of railroad bed materials and adjacent residential yards.	64 plus 2 duplicates	Railroad Beds: As, Cd, Cu, Pb, Zn, & pH Residential Yards: As, Pb
MBMG 2001. Soil Borings, Tailings and Overburden Thicknesses and Volumes, Lower Area One and Metro Storm Drain.	Conducted soil borings in 19 locations in the Upper Metro Storm Drain Areas to confirm the presence and thickness of buried tailings and mine waste deposits.	Lithologic descriptions, waste volume estimates, Simulated Acid-Rain Leach testing and XRF analyses performed on cores and discrete waste samples.	22 acid-rain leach tests. XRF analyses performed on 4 samples.	Acid-rain leach tests: pH, SC, As, Cd, Cu, Zn XRF: As, Cd, Cu, Pb, Zn
MBMG 2004. Summary of Investigation Upper Silver Bow Creek, Butte, Montana. Montana Bureau of Mines and Geology Open File Report 507.	Lithologic and groundwater quality information from installation of six monitoring wells in the Metro Storm Drain. Also, column leach tests performed on alluvial materials obtained from two separate locations in the Metro Storm Drain.	Lithology, groundwater quality and leachate analyses for column leach tests	NA	Groundwater Quality Data: Dissolved Metals, water quality parameters, major ions, nutrients, tritium and helium isotopes. Column test leachate: Cd, Cu, Fe, Zn
MBMG 2006. Soil Borings at Butte-Silver Bow Metro Sewage Treatment Plant and Butte Reduction Works, Butte, Montana.	Soil core drilling program to expand knowledge of tailings thicknesses at MSTP and BRW, and refine the tailings volume estimates for LAO.	Soil Borings to visually confirm presence or absence of tailings	NA	NA

NA - Not Applicable, because not included in BPSOU surface soils database.

Reasons datasets were omitted listed in Section 3.2 of Final RI Soil/Mine Waste Characterization

SAR - Sodium Absorption Ratio; TOC - Total Organic Carbon; CEC - Cation Exchange Capacity; EC - Electrical Conductivity



**Table 2-2**  
**Summary of Previous Surface Water and Sediment Investigations**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**

Reference	Surface Water/Sediment Summary	Types of Surface Water/Sediment Information Collected	Number of Locations Sampled	Number of Sample Analyses	Analytes
MultiTech, 1987. Silver Bow Creek Remedial Investigation Final Report Phase I RI).	Characterized surface water flow and quality associated with the Silver Bow Creek CERCLA Site.	Surface water flow and quality monitoring, storm water sampling, installation of permanent stream gaging stations	22 <sup>1</sup>	159 <sup>1</sup>	Varied, generally: As, Cd, Cu, Fe, Pb, Zn, NO <sub>3</sub> , SO <sub>4</sub> , TDS, TSS, Hardness, Alkalinity, pH, SC, Temperature, Flow
CH2M Hill, 1987a. Data Summary Report Supplemental Remedial Investigation, Silver Bow Creek Site	Collected surface water and stream sediment data from Silver Bow Creek, upper Clark Fork River, and their tributaries to help characterize the Silver Bow Creek Site.	Surface water flow and quality monitoring, stream bed sediment sampling	31 Surface Water <sup>1</sup> 6 Sediment <sup>1</sup>	95 Surface Water <sup>1</sup> 12 Sediment <sup>1</sup>	Surface Water: Al, As, Cd, Cr, Cu, Fe, Mn, Pb, Zn, SO <sub>4</sub> , TSS, Eh, General Chemistry & Flow Sediment: Al, As, Cd, Cr, Cu, Fe, Mn, Pb, Zn, DO, Eh & General Chemistry
Ingman, G.L., 1987. Completion Report and Final Data Summary, Clark Fork River Basin Water Quality Monitoring Project RIT-86-8503.	Performed water quality monitoring for the entire Clark Fork River at 31 fixed stations with 16 samples each. Two of the stations are located within the BPSOU.	Surface water flow and quality monitoring, macroinvertebrate and periphyton sampling	2	38	As, Cu, N, P, Zn, O-P04, NH <sub>3</sub> -N, NO <sub>3</sub> +NO <sub>2</sub> , TSS, General Chemistry & Flow
CH2M Hill and Chen-Northern, 1990a. Draft Final Silver Bow Creek CERCLA Phase II Remedial Investigation Summary, Area 1 Operable Unit.	Filled in data gaps of Phase I RI (MultiTech, 1987). Focused on characterizing surface water quality during a snowmelt runoff event and a baseflow sampling event in the Area One Operable Unit.	Surface water flow and quality monitoring, storm water sampling, baseflow sampling	11	14	Varied, generally: Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Fe, Hg, Mn, Ni, Pb, Sb, Se, Ti, V, Zn, NO <sub>3</sub> , SO <sub>4</sub> , TSS, CLP RAS Organics, General Chemistry & Flow
Ingman, G.L. and M.A. Kerr, 1990. Water Quality in the Clark Fork River Basin, Montana, State Fiscal Years 1988-1989	Continuation of study documented in (Ingman, 1987). Monitoring stations increased to 32 total with 3 stations located within the BPSOU.	Surface water flow and quality monitoring, macroinvertebrate and periphyton sampling	3	93	As, Cd, Cu, N, P, Pb, Zn, P04, NH <sub>3</sub> -N, NO <sub>3</sub> +NO <sub>2</sub> , TSS, General Chemistry & Flow
ARCO, 1992a. Draft Remedial Investigation Report, Montana Pole & Treating Plant Site. Prepared by Keystone, Inc.	Performed surface water and stream sediment sampling to help assess the effect of the Montana Pole and Treating Plant Site on Silver Bow Creek.	Surface water flow and quality monitoring, stream bed sediment sampling	7 Surface Water 4 Sediment	11 Surface Water 4 Sediment	Surface Water: As, Cd, Cr, Cu, Pb, Zn, Organic Compounds (Phenols, PAHs, VOCs, TPHs, TOG) TDS, TSS, pH, SC, Temperature & Flow Sediment: As, Cd, Cr, Cu, Pb, Zn & Organic Compounds (Phenols, PAHs, VOCs, TPHs, PCBs, dioxins)
PRP Group, 1994. DS/DV/DU Report, BPSOU, 1993 Storm Water Investigations.	Characterize hydrology of the BPSOU and determine the nature, extent, and potential sources of metals loading to surface waters	Surface/storm water flow and quality monitoring, precipitation monitoring	14	115	Ag, Al, As, Cd, Cu, Fe, Hg, Mo, N, P, Pb, Sb, Zn, NH <sub>3</sub> -NH <sub>4</sub> , NO <sub>2</sub> , NO <sub>3</sub> , SO <sub>4</sub> , TDS, TSS, DO, COD, General Chemistry & Flow
PRP Group, 1995a. DS/DV/DU Report, BPSOU, 1994 Storm Water Investigations	A continuation of PRP Group (1994) to characterize hydrology of the BPSOU and determine the nature, extent, and potential sources of metals loading to surface waters	Surface/storm water flow and quality monitoring, precipitation monitoring	11	32	Ag, Al, As, Cd, Cu, Fe, Hg, Mn, N, P, Pb, Sb, Zn, NH <sub>3</sub> -NH <sub>4</sub> , NO <sub>2</sub> , NO <sub>3</sub> , SO <sub>4</sub> , TDS, TSS, DO, COD, General Chemistry & Flow
PRP Group, 1996b. DS/DV/DU Report, BPSOU, 1995 Storm Water Investigations	A continuation of PRP Group (1994, 1995a) to characterize hydrology of the BPSOU and determine the nature, extent, and potential sources of metals loading to surface waters	Storm water flow and quality monitoring, precipitation monitoring	11	115	Ag, Al, As, Ba, Be, Cd, Cr, Cu, Fe, Hg, Mn, Mo, Pb, Sb, Se, Zn, NO <sub>3</sub> , SO <sub>4</sub> , TDS, TSS, General Chemistry & Flow
CDM Federal, 1997. Final 1996 Storm Water Monitoring Data Summary Report, BPSOU, Prepared for EPA	Collected data to allow correlation between the amount of precipitation and the volume of storm water runoff in the upper Missoula Gulch watershed.	Storm water flow monitoring in upper Missoula Gulch, precipitation monitoring	0	0	Flow
PRP Group, 1997. DS/DV/DU Report, BPSOU, 1996 Storm Water Investigations	A continuation of PRP Group (1994, 1995a, 1996b) to characterize hydrology of the BPSOU	Storm water flow monitoring, precipitation monitoring	0	0	Flow
CDM Federal, 1998. Data Summary Report for Stream-Sediment and Soil Sampling in Grove Gulch, Blacktail Creek, and the Silver Bow Creek Diversion Channel.	Collected stream sediment samples to assess potential for Grove Gulch to contribute impacted stream sediments to Blacktail Creek and Silver Bow Creek. Appendix A of CDM (1998) includes 2 stream sediment samples from Missoula Gulch collected by MBMG, but unpublished.	Streambed sediment sampling and adjacent soils (Soil samples discussed in Table 1-1 and Section 1.5.1)	12 Sediment 1 Sediment Appendix A unpublished MBMG data	12 Sediment 2 Sediment Appendix A unpublished MBMG data	Sediment: As, Cd, Cu, Pb, Zn MBMG Sediment: Al, As, B, Ba, Cd, Cr, Cu, Fe, Li, Mn, Mo, Ni, P, Pb, Si, Sr, Ti, V, Zn, Zr,



**Table 2-2**  
**Summary of Previous Surface Water and Sediment Investigations**

**Record of Decision**  
*Butte Priority Soils Operable Unit*  
*Silver Bow Creek/Butte Area NPL Site*

Reference	Surface Water/Sediment Summary	Types of Surface Water/Sediment Information Collected	Number of Locations Sampled	Number of Sample Analyses	Analytes
PRP Group, 1998. Final DS/DV/DU Report BPSOU Surface Water Investigation	Presents the results of field and laboratory analysis of surface water samples collected during the Final Phase II RI/FS for the BPSOU.				
CDM Federal, 1999. Task Specific Sampling Memorandum for Stream-Sediment Sampling in Upper Silver Bow Creek, the Metro Storm Drain, and the Lower Portions of Blacktail Creek, Buffalo Gulch, and Missoula Gulch.	Collected stream sediment samples to assess metals associated with stream sediments in Silver Bow Creek and its tributaries within the BPSOU.	Streambed sediment sampling	19 Sediment	19 Sediment	Sediment: As, Cd, Cu, Pb, Hg, Zn, TOC
United States Geological Survey, Long-Term Clark Fork River Monitoring Program	Collect surface water flow and quality data at two locations within the BPSOU on Blacktail Creek and Silver Bow Creek. Water quality sampling began in March 1993 and has continued through the present, except for 1996. Sample frequency is eight times per year.	Surface water flow and quality monitoring	2	Approximately 90 through 1999, ongoing (16/year)	As, Cd, Cu, Fe, Mn, Pb, Zn, TSS, General Chemistry & Flow
BMFOU Remedial Design / Remedial Action Monitoring Program	Monitoring water quality monthly to determine I-Class standard for future treated water discharge requirements.	Surface water flow and quality monitoring	3	Approximately 300 through 1999 (ongoing) 50/year	Ag, Al, As, Cd, Cu, F, Fe, Mn, Pb, Se, Ti, Zn, NO3, SO4, & General Chemistry
ARCO 2000. Draft LAO Expedited Response Action Final Phase II Monitoring Report for May 1998 through June 30, 2000 and Quarterly Report for April 1, 2000 through June 30, 2000	Summarizes the monitoring activities conducted from April 1998 through June 2000.	Presents surface water and groundwater elevations, water chemistry, and surface water flow data for the period of April 1998 to June 2000	Varies, over 150 GW and SW monitoring locations	Quarterly from May 1998 through June 2000	Varies, some stations were water levels only, others included general chemistry and total and dissolved metals.
CDM Federal, 2000. Draft Technical Memorandum Regulatory Considerations for Storm Water Management at the Silver Bow Creek/Butte Area NPL Site	Considers site-specific storm water runoff characteristics in conjunction with federal, state and local storm water regulations in recommending a basis for storm water management and compliance the BPSOU.	NA	NA	NA	NA
ARCO 2005. Draft Data Summary and Interpretation Report, Base Flow and Wet Weather Data, October 2002 – September 2003	Summarizes and evaluates the surface water data collected during base flow and runoff events monitored from Oct. 2002 through Sept. 2003.	Base and wet weather flow and quality monitoring	64	Quarterly base flow measurements and 7 wet weather events from Oct. 2002 to Sept. 2003	Ag, Al, As, Cd, Cr, Cu, Fe, Hg, Mn, Pb, Zn, SO4, TDS, TSS, DO, Alk, pH, General Chemistry & Flow
ARCO 2005. Draft Data Summary and Interpretation Report, Base Flow and Wet Weather Data, October 2003 – September 2004	Summarizes and evaluates the surface water data collected during base flow and runoff events monitored from Oct. 2003 through Sept. 2004.	Base and wet weather flow and quality monitoring	63	Quarterly base flow measurements and 11 wet weather events from Oct. 2003 to Sept. 2004	Ag, Al, As, Cd, Cr, Cu, Fe, Hg, Mn, Pb, Zn, SO4, TDS, TSS, DO, Alk, pH, General Chemistry & Flow
ARCO 2003. Draft Data Summary and Interpretation Report, Base Flow and Wet Weather Data, October 2001 – September 2001	Summarizes and evaluates the surface water data collected during base flow and runoff events monitored from Oct. 2001 through Sept. 2002.	Base and wet weather flow and quality monitoring	59	Quarterly base flow measurements and 13 wet weather events from Oct. 2001 to Sept. 2002	Ag, Al, As, Cd, Cr, Cu, Fe, Hg, Mn, Pb, Zn, SO4, TDS, TSS, DO, Alk, pH, General Chemistry & Flow
ARCO, 2005. Butte Treatment Lagoons Draft Quarterly Data Summary Report, 3 <sup>rd</sup> Quarter 2005 (Quarterly Report No.14)	Summarizes and evaluates water quality and flow data collected from July 2005 to Sept. 2005 at the Lower Area One treatment lagoons.	Water quality and flows monitored	25	Flows monitored daily, water quality sampled 9 times per month.	Ag, Al, As, Cd, Cr, Cu, Fe, Hg, Mn, Pb, Si, U, Zn, Hard

TDS - Total Dissolved Solids, TSS - Total Suspended Solids, SC - Specific Conductance, DO - Dissolved Oxygen, COD - Chemical Oxygen Demand;

CLP RAS Organics - Contract Laboratory Program Routine Analytical Services organic analyses;

DS/DV/DU - Data Summary Data Validation/Data Usability

1 Includes sample locations outside of the BPSOU boundary.

2 General Chemistry Parameters usually include Ca, Mg, K, Na, Cl, Alkalinity, pH, temperature, specific conductance.



**Table 2-3**  
**Summary of Previous Groundwater Investigations**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**

Reference	Groundwater Summary	Types of Groundwater Data Collected	Number of Groundwater Locations Sampled	Number of Groundwater Sample Analyses	Analytes <sup>2</sup>
Botz, 1969. Hydrogeology of the Upper Silver Bow Creek Drainage Area, Montana.	Described occurrence, quality, and movement of groundwater in Upper Silver Bow Creek drainage area.	Aquifer testing, groundwater quality and water level monitoring	56	56	S04, General Chemistry
CH2M Hill, 1987a. Data Summary Report Supplemental Remedial Investigation, Silver Bow Creek Site	Vadose Zone Characterization Study to assess flux of metals from unsaturated stream side tailings into underlying groundwater.	Vadose zone hydraulic characterization	9	80	Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb, Sb, Se, Sn, Ti, V, Zn, & General Chemistry
CH2M Hill, 1987b. Final Data Summary Report Addendum, Supplemental Remedial Investigation, Silver Bow Creek Site	Data report containing pore water samples from the Vadose Zone Characterization study. Data were not available at the time of CH2M Hill 1987.	Vadose zone water quality monitoring	5	10	Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb, Sb, Se, Sn, Ti, V, Zn, & General Chemistry
MultiTech, 1987. Silver Bow Creek Remedial Investigation Final Report (Phase I RI).	Evaluated extent of groundwater impacted by COCs and significance of tailings as COC sources in Silver Bow Creek CERCLA Site.	Well installations, groundwater quality and water level monitoring, aquifer testing, soil water measurements	98	209	As, Cd, Cu, Fe, Pb, Zn, S04, General Chemistry, & Eh
EPA, 1989. Supplemental Data Package, Enclosure 1 - Attachment 3 of Notice Letter, Mine Flooding Operable Unit of the Silver Bow Creek/Butte Area NPL Site.	Supplemental data package associated with the Special Notice Letter and Draft Administrative Order for the Mine Flooding Operable Unit of the Silver Bow Creek Butte Area NPL Site. Package is Enclosure 1 - Attachment 3 in the Notice Letter.	Groundwater quality and water level monitoring	22	195	Varies, generally: Ag, Al, As, Ba, Cd, Cr, Cu, Fe, Hg, Mn, Pb, Se, Si, Zn, S04, & General Chemistry.
ARCO, 1990a. Colorado Tailings and Butte Reduction Works Project, Prepared by Hydrometrics, Inc.	Gathered groundwater data to support remediation actions within the LAO.	Well installations, groundwater quality and water level monitoring, aquifer testing	26	30	As, Cd, Cu, Fe, Pb, Zn, S04 & General Chemistry
ARCO, 1990b. Data Report, Lower Area One Groundwater, Bedrock, and Geotechnical Site Investigations, Silver Bow Creek CERCLA Site, Expedited Response Action, Prepared by Dames & Moore, Inc.	Further assessed groundwater conditions in LAO for COCs.	Well installations, groundwater quality and water level monitoring	5	5	Ag, Al, As, Ba, Cd, Cr, Cu, Fe, Hg, Mn, Ni, Pb, Si, Sr, Zn, S04 & General Chemistry
CH2M Hill and Chen-Northern, 1990a. Draft Final Silver Bow Creek CERCLA Phase II Remedial Investigation Summary, Area 1 Operable Unit.	Filled in data gaps of Phase I RI (MultiTech, 1987). Further defined nature, extent, and transport of groundwater impacted by COCs in the Area One Operable Unit.	Well installations, groundwater quality and water level monitoring, aquifer testing, surface geophysical investigation	71	126	Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Fe, Hg, Mn, Ni, Pb, Sb, Se, Ti, V, Zn, N03, S04, General Chemistry & Eh
CH2M Hill and Chen-Northern, 1990b. Draft Final Silver Bow Creek CERCLA Phase II RI Data Addendum, Area 1 Operable Unit	Addendum of groundwater analytical data to the Phase II RI (CH2M Hill and Chen-Northern, 1990a).	Groundwater quality data	72	72	Ag, As, As, Ba, Be, Cd, Co, Cr, Cu, Fe, Hg, Mn, Ni, Pb, Sb, Se, Ti, V, Zn, N03, S04, & General Chemistry.
ARCO, 1992a. Draft Remedial Investigation Report, Montana Pole & Treating Plant Site, Prepared by Keystone, Inc.	Identified nature and extent of COCs in groundwater associated with the wood treating facility. COCs different than BPSOU.	Well installations, groundwater quality and water level monitoring, aquifer testing	53	76	As, Cd, Cr, Cu, Pb, Zn, Organic Compounds (PCP, PAHs, TPH, BTEX, dioxin/furans, etc.) & General Chemistry
ARCO, 1992. Lower Area One/West Camp Ground Water Treatability Study Quarterly Data Summary Report 1 <sup>st</sup> Quarter 2002 (Quarterly Report No. 1)	Field scale treatability study of combined LAO and West Camp ground water. Evaluates treating both LAO and West Camp flows in the LAO Colorado Tailings Treatment Lagoons.	Ground water quality, mixing of ground water flows, and treatment evaluation. Water level monitoring	13	61	Ag, Al, As, Cd, Cr, Cu, Fe, Hg, Mn, Pb, Si, Zn & General Chemistry
Groundwater Technology, 1992. Final Screening Site Inspection Report for the Montana Power Company's Montana Street Operation Center, Butte, MT.	Collected data to determine nature and extent of COCs at the Montana Power Company's Montana Street Operating Center	Well installations, groundwater quality and water level monitoring	9	19	Al, As, Ba, Be, B, Cd, Cr, Cu, Hg, Li, Mo, Ni, Pb, Sb, Se, Sr, Ti, Tl, V, Zn, Zr & General Chemistry



Table 2-3  
Summary of Previous Groundwater Investigations  
Record of Decision  
Butte Priority Soils Operable Unit  
Silver Bow Creek/Butte Area NPL Site

Reference	Groundwater Summary	Types of Groundwater Data Collected	Number of Groundwater Locations Sampled	Number of Groundwater Sample Analyses	Analytes <sup>2</sup>
ARCO, 1994a. Draft Remedial Investigation Report for the Butte Mine Flooding Operable Unit RI/FS, Prepared by Canonic Environmental Services, Inc.	Identified nature and extent of COCs in groundwater within the BMFOU. Some BMFOU monitoring wells are located within the BPSOU. Established a critical maximum level for water in the Berkeley Pit and performed a Private Well inventory.	Well installations, groundwater quality and water level monitoring, aquifer testing, private well inventory, groundwater modeling	77	144	Ag, Al, As, Ba, Cd, Cr, Cu, Fe, Hg, Mn, Ni, Pb, Si, Zn, NO <sub>3</sub> , SO <sub>4</sub> , General Chemistry & Eh.
ARCO, 1994b. Data package submittal for the Supplemental Hydrologic Investigations (no report).	Implemented to provide a groundwater supplement to the Storm Water Investigations. Objectives included developing preliminary estimates of the quality, quantity, and distribution of surface water/groundwater exchanges as related to potential COC loading to Silver Bow Creek.	Well installations, groundwater quality and water level monitoring, aquifer testing	43	43	Ag, Al, As, Cd, Cu, Fe, Hg, Mn, Pb, Sb, Zn, SO <sub>4</sub> & General Chemistry
PRP Group, 1998. Final DS/DV/DU Report BPSOU Groundwater Investigation February 1997 – January 1998.	Presents the groundwater data collected and analyses completed during the Final Phase II RI/FS for the BPSOU.	Groundwater quality tested and water level measured	Water level measured in 49 wells, samples taken from 38 wells	217	Ag, Al, As, Cd, Cu, Fe, Hg, Mg, Mn, K, Na, Alk, Cl, F, Pb, Ti, Zn, TDS, SO <sub>4</sub> , Sb & General Chemistry
ARCO, 2002. LAO/West Camp Groundwater Treatability Study. Quarterly Data Summary Reports, Numbers 1 through 14, ongoing	Presents sampling and analyses results for the Field-Treatability Study of combined LAO and West Camp groundwater at the LAO Colorado Tailings Treatment Lagoons at BPSOU.	Groundwater flow rate, pH and the rate time was added were measured, as was water quality	6 stations	68	Ag, Al, As, Cd, Cr, Cu, Fe, Hg, Mn, Pb, Si, Zn, and general chemistry
ARCO 2000. Draft LAO Expedited Response Action Final Phase II Monitoring Report for May 1998 through June 30, 2000 and Quarterly report for April 1, 2000 through June 30, 2000	Monitoring of surface water and groundwater re-equilibration after the LAO ERA to determine effectiveness of surface water and groundwater separation and effectiveness of groundwater capture and management	Groundwater Elevations and Groundwater chemistry, precipitation	Varies, over 150 GW and SW monitoring locations	Quarterly from May 1998 through June 2000	Varies, some stations were water levels only, others included general chemistry and total and dissolved metals
CDM 2003. Data Summary Report, May 2003 Metro Storm Drain Supplemental Base Flow Sampling	Mass loading study along the MSD channel from Harrison Avenue to station SS-03	Measured discharge and water chemistry at intervals along the MSD channel. Sampling was of groundwater discharging to surface water in the MSD channel	18 sample points (16 mainstem, 2 tributaries)	18 (for parameters shown)	Discharge, Total and Dissolved Al, Sb, As, Cd, Cu, Cr, Ca, Co, Fe, Pb, Mn, Mg, Hg, Ni, K, Ag, Na, Zn, sulfate, chloride, bicarbonate, carbonate, acidity, hardness, TDS, temperature, turbidity, oxidation-reduction potential (ORP), pH, specific conductance (SC), and dissolved oxygen (DO)
CDM 2004. Focused Feasibility Study of the Metro Storm Drain	Evaluated 7 alternatives for remedial action in the Metro Storm Drain	Used necessary data from previous studies (water levels, chemistry, seepage run, well logs, leaching tests, etc.)	NA	NA	NA
MBMG 2004. Summary of Investigation Upper Silver Bow Creek, Butte, Montana. Montana Bureau of Mines and Geology Open File Report 507.	Lithologic and groundwater quality information from installation of six monitoring wells in the Metro Storm Drain. Also, column leach tests performed on alluvial materials obtained from two separate locations in the Metro Storm Drain.	Lithology, groundwater quality and leachate analyses for column leach tests	6	6	Groundwater Quality Data: Dissolved Metals, water quality parameters, major ions, nutrients, tritium and helium isotopes. Column test leachate: Cadmium, copper, iron, and zinc.
ARCO 2004. MSD Post Construction Groundwater Monitoring	Monitoring plan to evaluate the change in the potentiometric surface after installation of the MSD subdrain	Water levels from wells and surface water bodies, flow and chemistry at subdrain cleanouts	Approximately 110 water levels measured	10 cleanouts, vault, and mouth of MSD	Water levels, metals As, Cd, Cu, Fe, Pb, Si, Zn, Mn, K, Ca, Na, and general chemistry
BMFOU Remedial Design / Remedial Action Monitoring Program	Monitoring changes in water levels and water quality. Water levels of the system will trigger components of remedial action program.	Well installations, groundwater quality and water level monitoring	49	Approximately 600 through 1999 (ongoing) 98/year	Varies, generally Al, As, Cd, Cu, F, Fe, Li, Mo, Mn, Ni, Pb, Se, Zn, NO <sub>3</sub> , SO <sub>4</sub> , Eh, & General Chemistry

<sup>1</sup> Includes sample locations outside of the BPSOU boundary.

<sup>2</sup> General Chemistry Parameters usually include Ca, Mg, K, Na, Cl, Alkalinity, pH, temperature, specific conductance



extensive response actions. The work was completed from the late 1980s through 2004. The final actions for two ongoing ERAs (Lower Area One and one for residential soils/ source areas) are determined in this ROD. These response actions were undertaken to address the immediate human health and environmental problems at Butte Priority Soils OU.

Although an expedited process was used to conduct these response actions, Superfund law requires that removal actions be implemented in ways that contribute to the efficient performance of a final long-term remedial action, to the extent practicable. Therefore, EPA required that the response actions be designed and constructed in a manner intended to be consistent with any final remedy. Response actions conducted at the BPSOU are summarized below.

***Walkerville TCRA (1988).*** Addressed mine waste dumps (e.g., Lexington Mine Yard) and residential soil areas contaminated with lead above 2,000 milligrams per kilogram (mg/kg) or mercury above 10 mg/kg in Walkerville. Nearly 300,000 cubic yards of material were removed from 10 sites. One mile of rock-lined ditch was also constructed to control surface water runoff from the recontoured waste piles. EPA also removed contaminated soil from six earthen basements and 33 residential yards.

***Timber Butte TCRA (1989).*** Approximately 40,000 cubic yards of contaminated soil were removed and consolidated in an on-site repository that was recontoured, covered with fill soil, and revegetated. Drainage was improved with recontouring and the installation of drainage ditches. Contaminated soil was removed from two residential yards and the yards were recontoured, covered with soil, and revegetated.

***Butte Priority Soils TCRA (1990 and 1991).*** Mitigated risks from a number of mine waste dumps, a concentrate spill, and seven residential yards located in Butte and Walkerville. Response actions were taken at 30 waste dumps (100,000 cubic yards) that were either capped or removed. In addition, a railroad bed and seven residential yards were reclaimed. These actions included removing waste, adding lime rock, capping with soil, application of fertilizer, and seeding each site.

***Colorado Smelter TCRA (1992).*** Addressed wastes associated with the Colorado Smelter. Approximately 40,000 cubic yards of mine waste were removed and consolidated in an on-site repository. The site was reclaimed and drainage channels were installed.

***Anselmo Mine Yard and Late Acquisition/Silver Hill TCRA (1992).*** Addressed a mine yard and several mine dumps in Butte. The work involved excavation of mine waste, recontouring, capping, and revegetation. Terracing, rock-lined ditches, and other drainage control measures were used for storm water management purposes.

***Walkerville II TCRA (1994).*** EPA conducted further removal activities in Walkerville to address four additional dump areas with elevated soil lead levels. In 1994 and 1995, 12 more waste dumps were removed or capped in place.



***Railroad Beds TCRA (1999 - 2004).*** Addressed railroad beds and adjacent residential yards at the OU that contain elevated concentrations of metals and arsenic (see Figure 2-2). The railroad beds were constructed using mining-related waste or contaminated by spillage during transport of ore or ore concentrates. The TCRA included significant storm water drainage improvements.

***Storm Water TCRA (1997 - present).*** Begun in 1997 to address storm water problems in Butte. To control storm water flow and minimize soil erosion and transport of contaminated sediment to Silver Bow Creek, storm water conveyance structures were built and large areas of barren land and contaminated soil were reclaimed with cover soil and revegetation. Storm water channels and detention ponds were placed in critical areas to minimize erosion and reduce the release and transport of contaminants from historic mining areas.

This response action also included reclamation of the Alice Dump and the removal of about 50 cubic yards of soils contaminated with elemental mercury in the Dexter Street area. The Alice Dump is a large waste rock dump located in upper Missoula Gulch that contained about 2 million cubic yards of contaminated soil and waste rock. At Dexter Street, a limited quantity of the mercury-contaminated soils failed Toxicity Characteristic Leaching Procedure (TCLP) and required disposal at an EPA-approved Resource Conservation and Recovery Act (RCRA) hazardous waste disposal facility. The remaining soils were disposed of at an on-site waste repository.

***Walkerville TCRA (2000).*** Residential properties in Walkerville that had not been previously sampled were sampled and cleanups implemented at those residences with elevated arsenic, lead, and/or mercury above action levels. Approximately 40 properties were addressed.

***Lower Area One (LAO) ERA (1992 - present).*** The LAO ERA focused on the removal of accessible mine waste and contaminated soils along Silver Bow Creek and across the floodplains associated with Silver Bow Creek in the area of the historic Colorado Tailings and Butte Reduction Works facilities. In May 1992, ARCO signed a Consent Order with EPA to implement EPA's selected response action alternative for the LAO ERA. Per the work plan, the response action was to be accomplished in three phases. Phase I, which was divided into Segments I and II, included the excavation, transportation, and disposal of tailings and other contaminated materials from LAO, partial backfilling of the site with clean materials, and construction of a new Silver Bow Creek channel. Phase II was an equilibration and monitoring period that involved the collection of ground and surface water data needed to determine the appropriate final response action at LAO. Phase III consists of the design and implementation of the final response actions relating to LAO, as described in this ROD.

The first step in the removal was Phase I, Segment I activities consisting of the excavation and transport via railroad of the "dry" contaminated material above the water table to the Opportunity Ponds near Anaconda. A total of 270,600 cubic yards of materials were excavated from 1993 to 1994 during Phase I, Segment I. During



1995, EPA and ARCO initiated Phase I, Segment II pilot-scale excavation activities consisting of the removal of wet contaminated materials below the water table. The pilot-scale operation demonstrated that dewatering could be achieved by trenches to intercept groundwater and, in 1996, full-scale dewatering and excavation of saturated materials began. To expedite the cleanup, a proposal was made in the summer of 1996 to haul the contaminated materials by truck to the nearby Clark Tailings site rather than continue to transport to the Opportunity Ponds by rail. Following public comment and subsequent approval of the proposed Clark Tailings repository and future use plan in spring 1997, excavated waste materials were transported to the Clark Tailings area throughout the summer and fall of 1997. By the end of 1997, Phase I activities had removed a total of 1.2 million cubic yards of mine waste and contaminated soils from Silver Bow Creek and the associated floodplains in the area of the Colorado Tailings and Butte Reduction Works. The area was then backfilled with imported material and grasses, forbs, and trees were planted to establish a diverse and nature vegetative cover. The stream channel was reconstructed in accordance with rigid engineering standards to maintain an elevated stream channel to insure a losing stream. Waste removal during the Lower Area One ERA was completed to a predetermined excavation limit established on the basis of the natural pre-existing land contours. Although the excavation limit ensured that the majority of the waste and contaminated soil was removed, waste was left in some areas that were below the excavation limit. In addition, in-situ waste and contaminated soils remain under the Metro Sewage Treatment Plant facility, and the historic aqueduct and slag walls. A hydraulic control channel was constructed parallel to the floodplain to collect groundwater. The captured groundwater is treated in the Treatment Lagoon Demonstration Project before discharge back to Silver Bow Creek.

Phase II of the Lower Area One ERA has been completed during which the hydrologic equilibration and monitoring of ground and surface water occurred and water treatability studies were performed. Phase III, which includes final reclamation and land use planning for this area, will be decided and performed as a component of this ROD. For example, the selection of a collection and treatment requirement for groundwater for this area is included in this ROD.

***Butte Priority Soils OU ERA Residential Soils/Source Areas(1994-Present).*** EPA implemented a program to remediate residential metals and arsenic that focused on certain residential areas with soil-lead concentrations above the residential lead action level (1,200 mg/kg) and the arsenic level of 250 mg/kg. Under this action, EPA, MDEQ, Butte-Silver Bow, and ARCO integrated the removal of residential lead contaminated soils associated with mine-related wastes and the removal or mitigation of lead contaminants from non-superfund sources. This provided BSB with funding and the flexibility to implement a comprehensive public health program while meeting EPA's initial removal action requirement. The BSB Lead Intervention and Abatement Program goal is to reduce the level of lead exposure incurred by children 0-6 years, pregnant women and nursing mothers in a manner that results in long-term health benefits. Butte-Silver Bow's program targets all sources of lead, including interior and exterior lead based paint, interior lead dust, water and residential soils for certain residential areas.



The source area portion of this action included the remediation of areas that were above the lead action level of 2,300 mg/kg.

#### *Other Actions*

***Lower Area One Manganese Removal (1992).*** This removal action was used to remove manganese ore stockpiles in Lower Area One within the floodplain of Silver Bow Creek. The piles were located east of the Metro Sewage Plant and west of Montana Street in Lower Area One. The Defense Logistics Agency and EPA conducted the manganese removal. The stockpiles included ore and process tailings remaining after efforts by the Department of Defense to process manganese ore at the Butte Reductions Works Plant during World War II.

A total of 261,000 cubic yards were moved to a private repository in Whiskey Gulch, west of the Butte Priority Soils OU (Bureau of Reclamation 1992). The action was a critical ancillary action to the Lower Area One ERA.

***Old Butte Landfill/Clark Mill Tailings (1998).*** A RCRA corrective action and permitting process was completed at this site southwest of Butte, in combination with EPA mandated Superfund action. The site consisted of a 60-acre impoundment with approximately 1 million cubic yards of mill tailings immediately adjacent to, and partially mixed with, the old Butte Municipal Landfill. The mixed nature of the wastes necessitated a combined Superfund and RCRA response action be performed under RCRA jurisdiction.

At the Clark Mill Tailings, approximately 800,000 cubic yards of the Colorado Tailings removed from Lower Area One were placed in the repository constructed at this site. The final RCRA repository cover was designed in 1997 and constructed in 1997 and 1998. The overall design included the subsequent construction of a recreational complex on top of the repository that included several irrigated ball fields, play areas, and park buildings. The recreational complex was opened in 2001. This area is permitted by DEQ under its solid waste authorities.



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## Section 3 Highlights of Community Participation

CERCLA Sections 113 and 117 and NCP Section 300.430(f)(3) require public participation in the remedy selection process. The statute and regulation require that before adoption of any plan for remedial action to be undertaken by EPA, the State, or individual (e.g., potentially responsible party), the lead agency must:

- Publish a notice and make the proposed plan available to the public.
- Include in the proposed plan sufficient information to provide a reasonable explanation of the preferred remedy and alternative proposals considered.
- Provide reasonable opportunity for submission of written or oral comments and an opportunity for a public meeting at or near the site regarding the proposed plan and any proposed findings relating to cleanup standards.
- Keep a transcript of the meeting and make such transcript available to the public.

Additionally, notice of the final remedial action plan set forth in the ROD must be published and the plan must be made available to the public before commencing any remedial action. Such a final plan must be accompanied by a discussion of any significant changes to the preferred remedy presented in the proposed plan along with the reasons for the changes. A response (responsiveness summary) to each of the significant comments, criticisms, and new data submitted in written or oral presentations during the public comment period must be included with the ROD.

EPA has conducted the required community participation activities and additional community involvement activities through an extensive program of community involvement, the components of which are outlined below.

### 3.1 Release of a Proposed Plan

The BPSOU Proposed Plan was released to the public on December 20, 2004. The plan presented an overview of the site and presented EPA's preferred alternative for remediation. It also discussed the comment period, how to provide comment, and notice of the time and place of public meetings regarding the Proposed Plan.

The Proposed Plan was sent by mail to approximately 100 people on December 20, 2004 and was hand-delivered to high priority parties and individuals in Butte. Copies were also made available at the Citizens Technical Environmental Committee office on December 20, 2004.

Copies of the Remedial Investigation, Risk Assessments, Feasibility Study, and Proposed Plan were made available to the public for review at the following locations:



- Montana Tech Library, located at West Park in Butte, Montana
- Butte EPA Office, located at 155 West Granite in Butte, Montana
- EPA - Montana Office, located at 10 West 15th Street, Suite 3200, in Helena, Montana

### **3.2 Monthly "Superfund and You" Newspaper Column**

On December 12, 2004, 12 days prior to the release of the Proposed Plan, the upcoming release was announced in the monthly column placed by EPA in The Butte Standard. The upcoming public meeting was also announced. The title of the column was "Superfund and You - EPA's Proposed Plan for the Butte Cleanup." This was the 13th in a series of monthly columns that were initiated to raise public awareness of the upcoming Proposed Plan and ROD. The columns covered issues of special interest to the public, especially where there was an event or an opportunity for public involvement.

### **3.3 EPA Press Release**

On December 20, 2004, EPA issued a press release announcing the release of the Proposed Plan, how and where the plan could be obtained, and the date of the public meeting. The press release was sent to the following media outlets:

- The Montana Standard - the local daily paper
- Butte Weekly - a free weekly paper
- The 'Roun'Town Review - a free monthly paper
- Technocrat - Montana Tech newspaper
- The Missoulian - a daily newspaper in a nearby community
- The Helena Independent Record - a daily newspaper in a nearby community
- The Great Falls Tribune - a daily newspaper in a Montana community
- The Bozeman Daily Chronicle - a daily newspaper in a nearby community
- The Billings Gazette - a daily newspaper in a Montana community
- The Lee Newspapers State Bureau
- The Associated Press
- KBOW-AM/KOPR-FM - a local radio station
- KMSM-FM- the local university radio station
- KXTL-AM/ KMBR-KAAR - FM - a local radio station



- KUFM Missoula - the nearest public radio station

### 3.4 Display Advertisements

A total of four individual display advertisements were prepared and placed in one or more of the local newspapers after the release of the proposed plan. The display ads consisted of:

- Announcement of the release of the proposed plan and planned public meeting
  - The Montana Standard (local daily newspaper) on December 22, 2004
  - The Butte Weekly (the free weekly newspaper) on December 23, 2004
  - The 'Roun'Town Review (free monthly newspaper) on January 3, 2005
- Announcement of details of the first public meeting
  - The Butte Weekly on January 19, 2005
  - The Montana Standard on January 22, 23 and 24, 2005
- Announcement of extension of the comment period
  - The Butte Weekly on January 19, 2005
  - The Montana Standard on January 22, 23 and 24, 2005
- Announcement of details of the second public meeting
  - The Montana Standard on March 11, 13, and 14, 2005

### 3.5 Public Comment Period

The public comment period for the proposed plan was initially set at 60 days. This period was subsequently extended to 90 days (December 20, 2004 to March 20, 2005) based on feedback from the public.

### 3.6 Summary Fact Sheet

A four-page fact sheet devoted entirely to the Proposed Plan, entitled "Summary of the Proposed Plan", was sent to EPA's Butte mailing list on December 20, 2004. The fact sheet was also distributed to the general public as an insert in the Montana Standard on December 22, 2004. It was included as an insert in the Butte Weekly on December 23, 2004. A total of 25,000 fact sheets were printed for insertion into the two newspapers.

### 3.7 Public Hearings

Two public hearings were held in Butte after the release of the Proposed Plan. The first was on January 25, 2005 at the Montana Tech campus. Approximately 150 people



attended that meeting. The second meeting was held on March 15, 2005 at the Elks Lodge in uptown Butte (206 W. Galena Street) and had approximately 30 attendees.

These meetings were focused on accepting formal oral comments from the public. Thirty-two people provided oral comment at the first meeting and 10 did so at the second meeting. A court reporter transcribed the comments and EPA made the meeting transcripts available to the public by placing them in the Administrative Record.

### **3.8 EPA Web Site**

The Proposed Plan and the meeting date were published on the web page below on Jan. 3, 2005. The web address is [www.epa.gov/region8/superfund/sites/mt](http://www.epa.gov/region8/superfund/sites/mt).

### **3.9 Butte Citizen's Working Group**

EPA funded the "Butte Citizens' Working Group" to provide another opportunity for interested residents to discuss issues related to Superfund activities and to provide input to the remedy selection process. The group provided comments on the Proposed Plan during the formal comment period.

### **3.10 Available Supporting Documents**

The Administrative Record, including the Remedial Investigation and Feasibility Study, was available for public review and comment during the Proposed Plan public comment period. The documents available included the following:

- Phase II Remedial Investigation Report, Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area Superfund Site, prepared by ARCO dated April 2002. Report is two volumes - Volume I: Text and Appendices, Volume II: Tables, Figures, & Plates.
- Addendum - Final Phase II Remedial Investigation (RI) Report, Butte Priority Soils Operable Unit (BPSOU), prepared for the PRP Group by MFG, Inc , dated May 14, 2003.
- Response Action Summary Document, prepared by ARCO dated October 2, 2003.
- Phase II Feasibility Study Report, Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area Superfund Site, prepared by ARCO dated April 2004.
- Final Preliminary Baseline Risk Assessment, Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site, Butte, Montana, prepared for EPA by CDM dated April 26, 1991.
- Final Preliminary Baseline Risk Assessment, Lower Area One, Silver Bow Creek/Butte Area NPL Site, Butte, Montana, prepared for EPA by CDM dated August 25, 1991.



- Draft Baseline Risk Assessment for Lead, Expedited Response Action, Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site, prepared for EPA by CDM dated February 11, 1994.
- Final Risk Assessment, Butte Priority Soils Operable Unit, Baseline Human Health Risk Assessment For Arsenic, Silver Bow Creek/Butte Area NPL Site, Butte, Montana, prepared for EPA by CDM dated April 29, 1997.
- Technical Memorandum, Addendum to the Baseline Human Health Risk Assessment, Evaluation of Human Health Risks Associated With Exposure to Alluvial Ground Water, Silver Bow Creek/Butte Area NPL Site, Butte-Silver Bow County, Montana, Butte Priority Soils Operable Unit, prepared for EPA by CDM dated July 26, 2000.
- Final Baseline Ecological Risk Assessment, Silver Bow Creek/Butte Area NPL Site, Butte Priority Soils Operable Unit, Butte, Montana, prepared for EPA by CDM dated September 21, 2001.

### **3.11 Responsiveness Summary**

A responsiveness summary that summarizes significant public comments received during the comment period and EPA responses is included as Part 3 of this ROD.



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## Section 4 Scope and Role of Operable Unit

The Silver Bow Creek/Butte Area Site is one of four Superfund Sites in the Clark Fork Basin. The four sites are:

- Anaconda Smelter Site
- Milltown Reservoir/Clark Fork River Site
- Montana Pole and Treating Plant Site
- Silver Bow Creek/Butte Area Site

Together with the Anaconda Smelter and Milltown Reservoir/Clark Fork River sites, the Silver Bow Creek/Butte Area Site is included in what is referred to as the Clark Fork Basin Superfund Sites (Figure 4-1). These sites were listed on the NPL to address the release or threat of release of contaminants related to the mining and ore-processing facilities in Butte and Anaconda and other mining related facilities in and along Silver Bow Creek and the upper Clark Fork River.

The Butte Priority Soils OU addressed by this ROD is one of many OUs in the Silver Bow Creek/Butte Area Site. This OU focuses on historic mining areas within the urban areas of Butte and Walkerville, as well as surface water and alluvial groundwater in the Silver Bow Creek floodplain through Butte, and is described more thoroughly in Part 2, Section 1.

The four Superfund sites in the Clark Fork Basin extend from the headwaters of Silver Bow Creek north of Butte to the Milltown Dam on the Clark Fork River near Missoula. Although the sites are interrelated, cleanup schedules and time frames are based on site-specific and OU-specific risk conditions. In some instances, these OUs are physically commingled. For example, the BMFOU addresses the bedrock groundwater system under a portion of the BPSOU. The West Side Soils OU includes other metals-impacted areas within the Silver Bow Creek/Butte Area Site not addressed under the BPSOU, the BMFOU, or the Active Mining OU. In addition, the Montana Pole and Treating Plant NPL Site is located entirely within the BPSOU boundary. There is some overlap, including the mobilization and transport of COCs to and from adjacent areas, among these sites. Generally, however, these sites are studied and remediated separately and distinctly.

The Montana Pole and Treating Plant Site is an organic waste site not related to mine wastes. It is a smaller, 40-acre state-lead site located entirely within the Butte Priority Soils OU. This former wood treating facility, located along the south side of Silver Bow Creek opposite of Lower Area One, is contaminated with pentachlorophenol and other organic compounds used as wood preservatives. A multiple-phase cleanup started in 1996 with final completion expected before 2010. DEQ will continue to



operate a Montana Pole water treatment plant and in-situ treatment facilities for decades at this site.

***Silver Bow Creek/Butte Area NPL Site***

The Silver Bow Creek/Butte Area NPL Site is divided into two portions for administrative purposes - the Butte portion and the original portion. The Butte Priority Soils OU (as described extensively in this ROD) is one of four remedial OUs within Butte portion (Figure 4-1). The other three OUs in the Butte portion include:

***Butte Mine Flooding OU.*** This area consists of flooding of the Berkeley Pit and hydraulically connected underground mine workings and associated bedrock and alluvial aquifers in response to the cessation of dewatering practices. It also addresses the bedrock groundwater system under a large portion of the Butte Priority Soils OU.

EPA completed a ROD for this OU in 1994. A state-of-the-art treatment plant was recently completed to treat inflow from the active mine area. This treated water is currently being used by the active mining operations. Berkeley Pit water will be treated at this treatment plant when rising water levels in the Berkeley Pit reach the determined critical water level. Treated water will be discharged to Silver Bow Creek or reused within the active mine.

***West Side Soils OU.*** This OU encompasses areas of Silver Bow County that have experienced mining activity but lie outside of other OUs. This is generally north and west of the Butte Hill. EPA has conducted initial scoping activities for this OU.

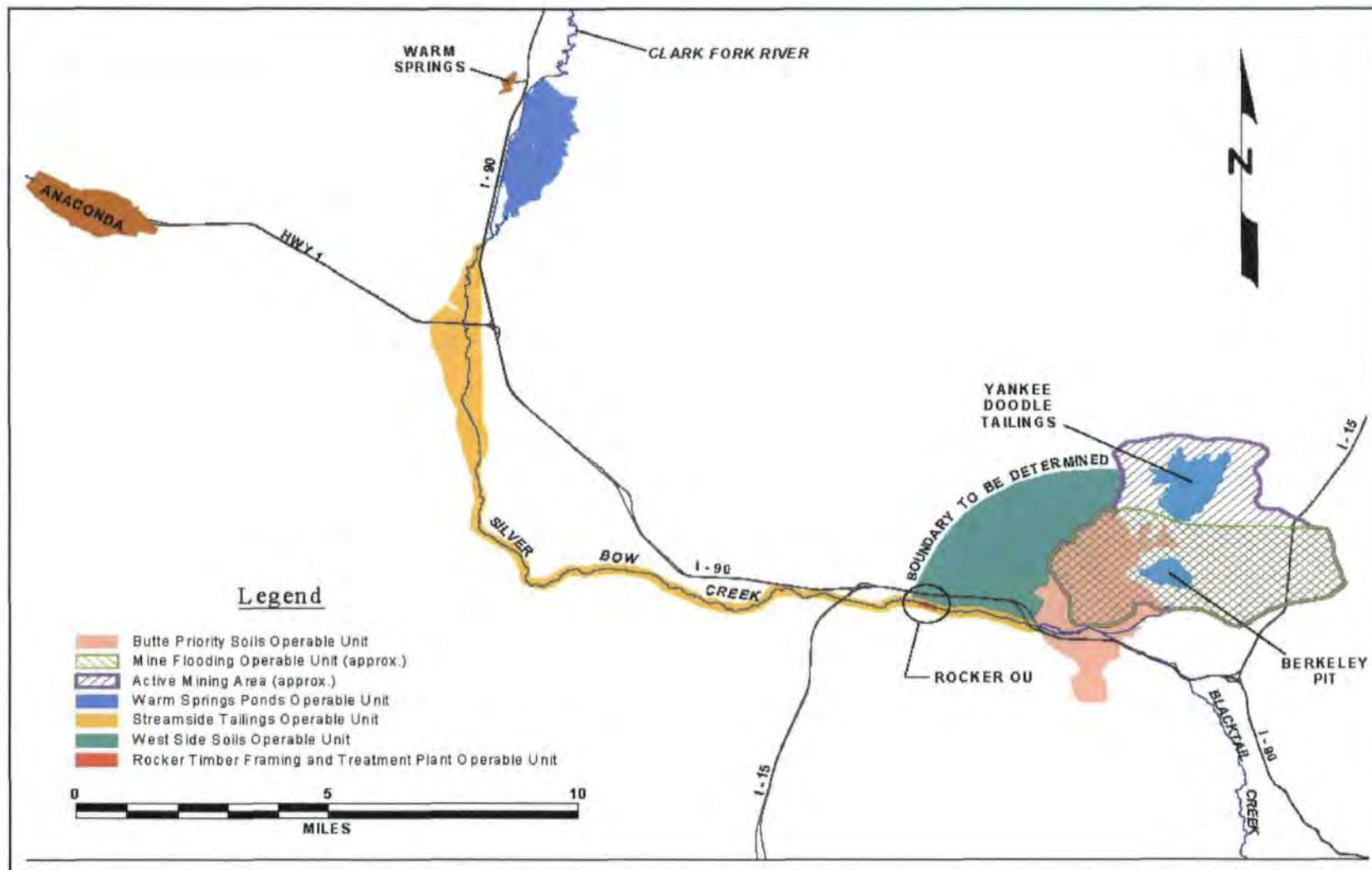
***Active Mining and Milling OU.*** This area is located east and northeast of the Butte Priority Soils OU and consists of the permitted mine area currently operated by Montana Resources. In 2002, EPA deferred Superfund action at the site to state authority under the operating hard rock mining permit.

The original portion of the Silver Bow Creek/Butte Area NPL site includes four remedial OUs:

***Streamside Tailings OU.*** The Streamside Tailings OU covers an area along Silver Bow Creek and its associated floodplain, and runs from the western end of the Butte Priority Soils OU to the point where Silver Bow Creek enters the Warm Springs Ponds. The OU extends for approximately 25 creek miles between Butte and Warm Springs.

The OU focuses on the fluvially deposited tailings along Silver Bow Creek and the adjacent railroad beds that are contaminated with mine waste. DEQ and EPA completed a ROD for this OU in 1995.





**Figure 4-1**  
Operable Units within the Silver Bow Creek/  
Butte Area NPL Site (approximate boundaries)  
Record of Decision  
Butte Priority Soils Operable Unit  
Silver Bow Creek/Butte Area NPL Site





Section 4  
Scope and Role of Operable Unit

The remedial action being implemented at this OU includes the in-situ treatment, excavation, and removal of floodplain materials containing high concentrations of heavy metals and arsenic. The stream channel is being reconstructed and grass, forbs, trees, and shrubs are being planted to reestablish a diverse and permanent vegetative cover along the reconstructed stream and throughout the floodplain. Construction work to implement the remedial plan was initiated in 1999. Restoration activities are being concurrently implemented with remedial activities. An effective and timely remedial action upstream at the Butte Priority Soils OU will help protect and compliment the remedial and restoration accomplishments at the Streamside Tailings OU remedy.

***Warm Springs Ponds Active and Inactive Area OUs.*** The Warm Springs Ponds are located at the western border of the Silver Bow Creek/Butte Area site and consist of three man-made ponds covering 2,400 acres around the confluence of Silver Bow, Mill, Willow, and Warm Springs Creeks. The ponds were constructed by ACMC between 1911 and 1959 to control the amount of mine and mill tailings and contaminated sediment carried into the Clark Fork River from Silver Bow Creek.

All mining-related contamination in these ponds is the result of migration from upstream sources (e.g., from Butte and Streamside Tailings) or from Anaconda site sources. Two RODs for this OU have been signed, one in 1990 and one in 1992. These two RODs are interim RODs and final remedial decisions for the Warm Springs Ponds area will be made at a later date. Remedial action has included removal of tailings, modification of channels to route flood flow, modification of berms, establishment of monitoring systems, upgrading of treatment systems, construction of wet-closure berms, chemical fixation of contaminated tailings and soils, long-term monitoring, and institutional controls. Currently, the active ponds function as settling/retention ponds to remove contaminants carried downstream by Silver Bow Creek to certain permitted levels, prior to discharge to the upper Clark Fork River. To facilitate removal of contaminants, lime is added to the inflow from Silver Bow Creek, which is then routed into the ponds. Construction was completed in 1995, and EPA's latest five-year review of the remedy found that it continues to protect human health and the environment. The long-term need for the Warm Springs Ponds as a treatment facility depends on the effectiveness of upstream cleanup activities.

***Rocker Timber Framing and Treating Plant OU.*** This OU is located about seven miles west of Butte and was the location of a wood treatment plant that operated for 48 years until it closed in 1957. The plant produced treated wood for use in the underground mines in the Butte area. Spilled process materials (arsenic trioxide powder), treated wood chip residues, and dripped or leaked process solutions (creosote and caustic heated arsenic brines) resulted in contamination of soils and groundwater.

In 1989, an initial response action removed approximately 1,000 cubic yards of contaminated material. EPA and DEQ signed a ROD in 1995 to address the remaining contamination in soils and groundwater. The Rocker site remedy involved an



innovative treatment technology to immobilize arsenic in soils and precipitate arsenic from groundwater.

An interim monitoring phase started in 1998. In 2001, a supplemental groundwater treatment action was initiated in support of remedial work being conducted at the adjacent Streamside Tailings OU. To date, EPA has determined that the remedy is protective of human health and the environment, although further actions at the site may be necessary.



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## Section 5 Summary of Site Characteristics

### 5.1 Site Overview

The BPSOU site is centered on the “Butte Hill”, which is the location of the historic Butte Mining District. Contaminants at the site, including arsenic and heavy metals such as cadmium, copper, lead, mercury, and zinc, are the result of 120 years of hard rock mining, smelting, milling, and other processing activities. Mining and ore-processing wastes in Butte are the primary source materials for COCs. These wastes come in several different forms, including mill tailings, waste rock, slag, aerial emissions, and mixed combinations of each. Arsenic and metals contained in, or released from these wastes to soil, surface water, and groundwater pose significant threats to human and ecological receptors.

The BPSOU is situated in a predominantly urban setting, and includes residential neighborhoods, schools and parks, as well as commercial and industrial areas. Land use within the BPSOU is subject to regulation by the Butte-Silver Bow (BSB) County government through local ordinances. In Section 1, Figure 1-3 is a map showing the major land uses in the BPSOU based on the BSB County Master Plan. The northern portion of the BPSOU is characterized by residential and commercial development and inactive mining operations. Light industrial activity, scattered residences, and the Silver Bow Creek floodplain characterize the central portion of the BPSOU. The southern portion is characterized by residential areas, inactive mining operations, cemeteries, and undeveloped land. The estimated population of the city of Butte was 34,128 in 1994. The 2000 U.S. Census reports Butte’s population to be 33,892.

The BPSOU covers an area of approximately five square miles and is located west of the continental divide at an elevation range of approximately 5,400 to 6,400 feet above mean sea level (amsl). The BPSOU encompasses the northwestern portion of the Summit Valley, which is characterized by gently sloping terrain, generally sloping toward the north in the southern portion of the valley and toward the west in the northern portion of the valley. Mountains bound the valley on the east, south, and north with highest elevations reaching over 10,000 feet in the Highland Mountains south of Butte.

Granitic rocks of the Boulder Batholith underlie the Butte area. They are primarily quartz monzonite intersected by porphyritic dikes and plugs. The rocks are fractured and faulted and extensively mineralized. This mineralization was the target of local mining. The communities of Butte and Walkerville were established close to the mining and milling centers as a matter of convenience. Operation of mills, concentrators, and smelters generated tailings, related wastes, and a variety of other materials that were deposited on-location, in the midst of residential areas.

The two primary streams in the valley are Blacktail Creek, which begins in the Highland Mountains to the south, and Silver Bow Creek, which is now considered to begin at the confluence of Blacktail Creek and the MSD. Prior to mining, Silver Bow



Creek originated in the mountains northeast of the BPSOU. As mining production increased, mills and smelters were located along the creek. To accommodate mineral processing activities, Silver Bow Creek was rerouted as needed and was used for waste disposal. Tailings impoundments were constructed in the floodplain and wastes were discharged directly into the creek. With the advent of open pit mining, most of the original channel and floodplain were completely obliterated by the Berkeley Pit and the Yankee Doodle Tailings Pond.

The MSD was constructed in the 1930s by realigning and filling the original Silver Bow Creek channel, a low-lying swampy area, with numerous mine waste impoundments. Until 2004 when the groundwater subdrain was constructed, the MSD discharged a small amount of base flow. Thus the primary source of flow in Silver Bow Creek is Blacktail Creek. Below the confluence of MSD and Blacktail Creek, Silver Bow Creek flows west along the base of the Butte Hill, through the reconstructed stream channel at Lower Area One, and exits the OU.

The following sections provide a characterization of site media, specifically, solid media, groundwater, surface water, and air quality. Following the characterization of site media, the site conceptual model is presented. Historical and cultural resources are discussed at the end of the section.

## **5.2 Solid Media Characterization**

Since the listing of the site on the NPL in the early 1980s, numerous investigations have been conducted to characterize the soils and mine wastes in residential, commercial, and industrial areas of the OU. Nearly 3,000 soil/waste samples were collected and analyzed. The results were used to prepare the BPSOU Remedial Investigation Report and to delineate areas with elevated metal content.

Residential solid media characterization is presented first, followed by subsections concerning non-residential solid media characterization. These subsections include: upland mine waste/soils, Granite Mountain Memorial Area, railroad beds, and floodplain wastes. Floodplain wastes (including Lower Area One and Metro Storm Drain) are presented last to serve as a transition to groundwater and surface water characterization.

### **5.2.1 Residential Soil, Indoor Dust, and Attic Dust Characterization**

Many residences in Butte were built in close proximity to former mines and mineral processing facilities. In some instances, homes were built directly on top of mine wastes. Thus, many early investigations included the collection of residential soil samples.

In the late 1980s and early 1990s, several TCRAs were implemented based on EPA's lead-related human health risk assessment (CDM 1991 and CDM 1994) and data indicating the presence of lead contamination in many residential yards within the BPSOU site.



In the mid 1990s, a programmatic approach was adopted to address certain residential areas with lead concentrations greater than 1,200 mg/kg. The Butte-Silver Bow Lead Intervention and Abatement Program established a multi-pathway protocol for identifying candidate properties for lead abatement, typically properties inhabited by sensitive populations (children less than 6 years old, pregnant women, nursing mothers). The protocol not only takes into account lead-contaminated soils, but also considers the presence of other sources of lead associated with residential properties. Lead paint was used on the interior and exterior of a substantial number of homes in Butte and Walkerville and is a source of a substantial amount of the residential indoor lead.

In 2001, EPA completed an additional evaluation of the potential human health risks to children and adults living in Walkerville from exposure to arsenic, lead, and mercury in outdoor soil, indoor dust, mercury vapor, and attic dust. In general, concentrations of these metals were highest in attic dust or basement soil, lower in outdoor soil, and lowest in indoor living area dust. Approximately 20 percent of the residential yards sampled exceeded the lead action level and the affected homes are being addressed in on-going response actions. EPA determined in a risk assessment process done in coordination with ATSDR, that, in most homes, there is not a complete attic dust exposure pathway because attics are not living spaces and are infrequently accessed by Butte and Walkerville residents.

There are approximately 4,000 residential properties within the BPSOU boundaries. Approximately 800 yards have been sampled under the Butte Lead Intervention and Abatement Program. This indicates that there are approximately 3,200, residential properties remaining in the BPSOU to be sampled. Information presented in Appendix F-3 of the FS Report (PRP Group 2004) indicates that on average, 44 percent of the properties sampled in the past have exceeded one or more of the solid media action levels. This number of properties is expected to be higher than will actually be required, because recent activities have focused on Walkerville and portions of Butte where historical mining activities were more intensive and where lead, arsenic, and mercury levels in soils would be expected to be higher than in other residential portions of the BPSOU, such as the area closer to Interstate 90, which will likely have lower contaminant concentrations. Also, if data indicate residential properties in areas adjacent to the BPSOU exceed action levels, these properties will be remediated under the BPSOU ROD.

Residential soil abatements typically consist of excavating yards with elevated lead concentrations to a depth of 18 inches. A geo-textile liner is placed over the excavated area to provide a barrier against contaminated soil that may be present beneath the excavated area. The excavated area is backfilled with 18 inches of clean soil and either sod is laid down or an appropriate cap such as asphalt is placed over the clean soil.

If the residential yards are cleaned up in this manner, the buildings associated with the yards are tested for exterior lead based paint. If lead based paint is present on these buildings, the lead based paint is addressed to prevent recontamination of the residential yards.



Earthen basements with elevated levels of lead, arsenic and/or mercury are addressed by removing excess contaminated soil from the walls and floor. The walls are covered with a geo-textile liner and plywood is applied over the liner to prevent direct contact with contaminated soil. Cement is placed over earthen basement floors.

If contaminated interior household dust is detected in residential properties, the source of interior dust will be determined. The source (i.e. lead based paint or attic dust) is addressed and the interior dust is removed from the residence.

If lead is detected in tap water, an investigation is completed to determine if lead pipes and/or lead solder is present in the residence. If the lead source is found, it is removed.

If contaminated dust is detected in the attic and interior living space, the attic dust is removed using a high-powered vacuum cleaner in the attic. The interior living space is cleaned to remove all contaminated dust.

## **5.2.2 Non-Residential Soil/Waste Characterization**

Non-residential soils and mine wastes can generally be divided into 1) upland soils and mine wastes, 2) contaminated railroad beds, and 3) floodplain wastes. These are discussed in further detail below. Volumes of these categories of wastes are summarized in Table 5-1.

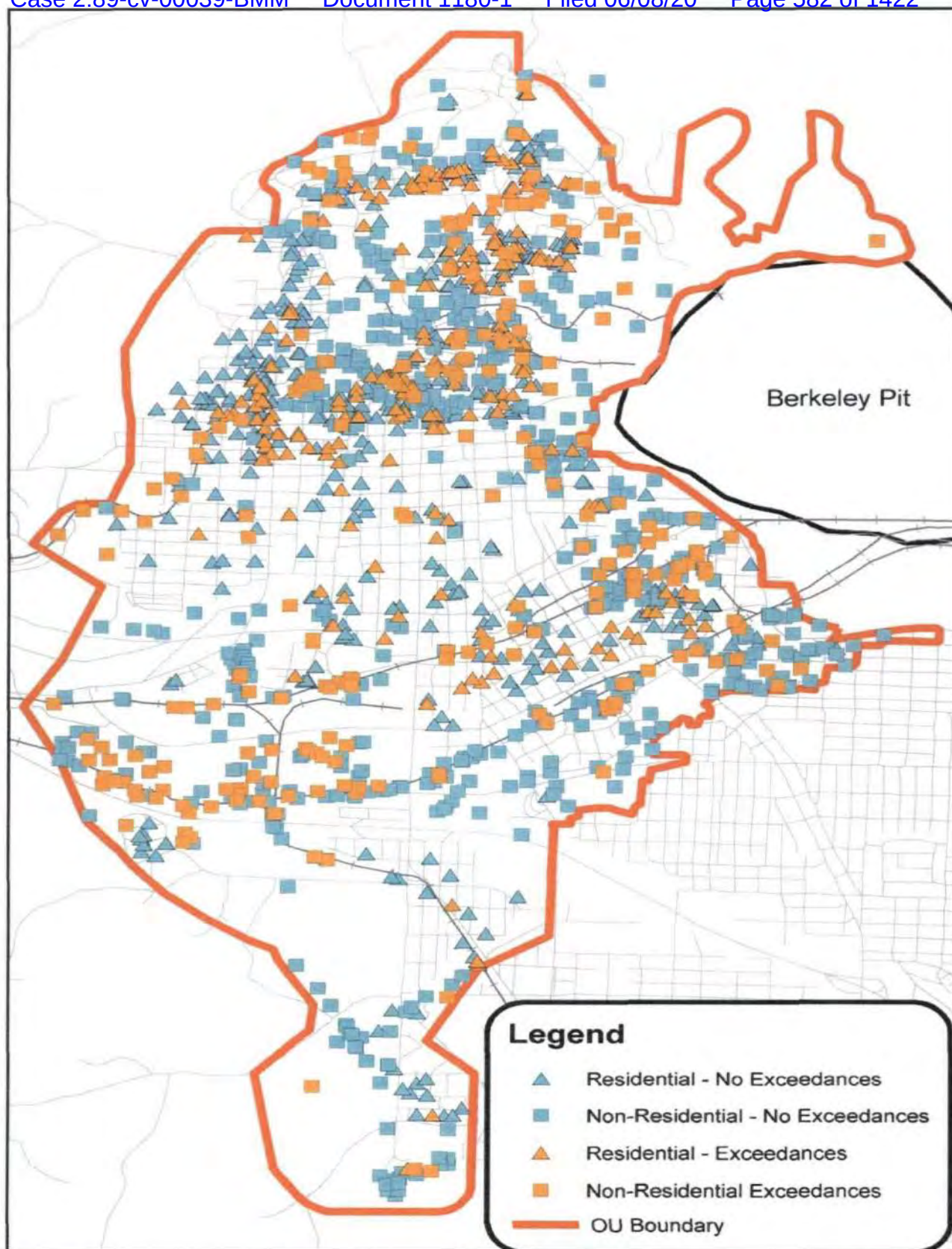
### **5.2.2.1 Upland Soils/Mine Waste Characterization**

The upland soils and mine waste areas generally refer to mining wastes from mining operations on the Butte Hill that are not immediately part of a residential property. These are also referred to as "source areas".

Among the largest and most comprehensive of the data collection efforts related to soil/mine waste were the Butte Soils Screening Study (CDM 1988) and the Field Survey of Unreclaimed Areas (CDM 1997a). The soils screening study provided EPA with analytical data to prioritize RI/FS studies and removal activities. The primary goal of the survey of unreclaimed areas was to conduct a final systematic inventory to identify any previously unidentified contaminated soil or mine waste. Numerous additional soil/mine waste source areas were identified during the survey. The data generated from the Butte Soil Screening Study and the Field Survey of Unreclaimed Areas were compiled with other solid media investigations (42 data sets) into a database for use in preparing the RI report.

More than 1,000 surface samples were collected in non-residential areas of the OU (Figure 5-1), of which approximately 20 percent exceeded an arsenic or lead action level. Except for the Railroad Beds TCRA, which was arsenic-driven, removal actions





**Figure 5-1**  
**Soil Sample Locations**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**





*Section 5*  
*Summary of Site Characteristics*

involving source areas were implemented primarily to address exceedances of the lead action level (2,300 mg/kg).

To date, 422 acres of source areas have been reclaimed. The initial quantity of mining-related wastes in upland areas was approximately 7.8 million cubic yards.

Approximately 6.9 million cubic yards of mine waste have been removed or reclaimed as a result of completed response actions, leaving roughly 0.9 million cubic yards of wastes that are being considered for future remedial action at the site (Table 5-1). It is estimated that 0.1 million cubic yards of this remaining amount may exceed arsenic and lead action levels and require reclamation. It is estimated that the remaining 0.8 million cubic yards do not exceed arsenic and lead action levels. These source areas may be reclaimed in the future to address storm water concerns.

With the exception of a relatively small number of known source areas identified in the FS, all of the sample locations of source areas where lead and/or arsenic exceedances were detected (Figure 5-2) have been reclaimed or otherwise addressed by previous response actions. Known or unknown source areas exceeding action levels will be addressed in accordance with the ROD.

#### **5.2.2.2 Granite Mountain Memorial Area**

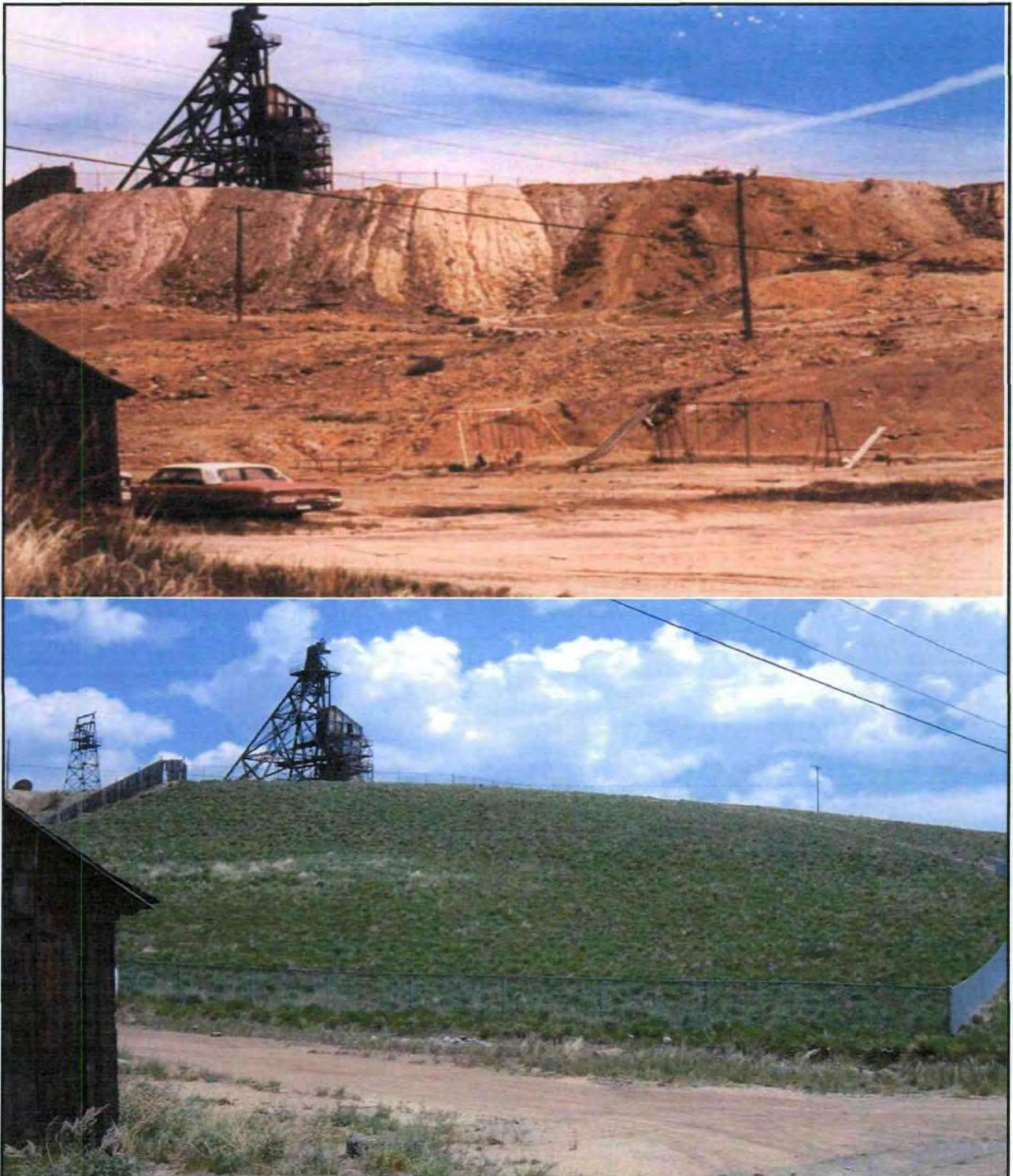
The Granite Mountain Memorial Area (GMMA) is a recent addition to the BPSOU and is located in the northeastern part of the OU (Figure 5-3). The memorial is dedicated to the 168 miners who perished in the disastrous Granite Mountain-Speculator fire in 1917.

Unlike other portions of the OU, it comprises a relatively large area of unreclaimed waste dumps that are not located in residential areas or in the Silver Bow Creek drainage. Portions of the GMMA will be reclaimed. Other portions of the site will remain unreclaimed and these areas will be fenced to prevent people from coming into direct contact with these mine wastes. Significant work will be completed on the memorial including a picnic area, landscaping with native shrubs and trees, and paving the main access road to the GMMA. Surface soils and mine waste materials in this area have been sampled and analyzed during three separate sampling programs. Of the 65 samples collected, only one exceeded the open space/recreation action level for arsenic. Seven (11 percent) exceeded the source area action level for lead. Air monitoring was conducted at the GMMA for a one-year period. The results indicated there were no elevated levels of or exceedances of heavy metals during the air sampling.

#### **5.2.2.3 Railroad Beds**

A railroad network to service, support, and supply the mining activity was essential to mining in Butte. Ore from Butte was transported via rail to smelters in Anaconda for nearly 100 years. As Butte's population grew, the rail lines transected many of the neighborhoods. Today, approximately 55,000 linear feet of railroad beds exist within the OU (Figure 5-3).

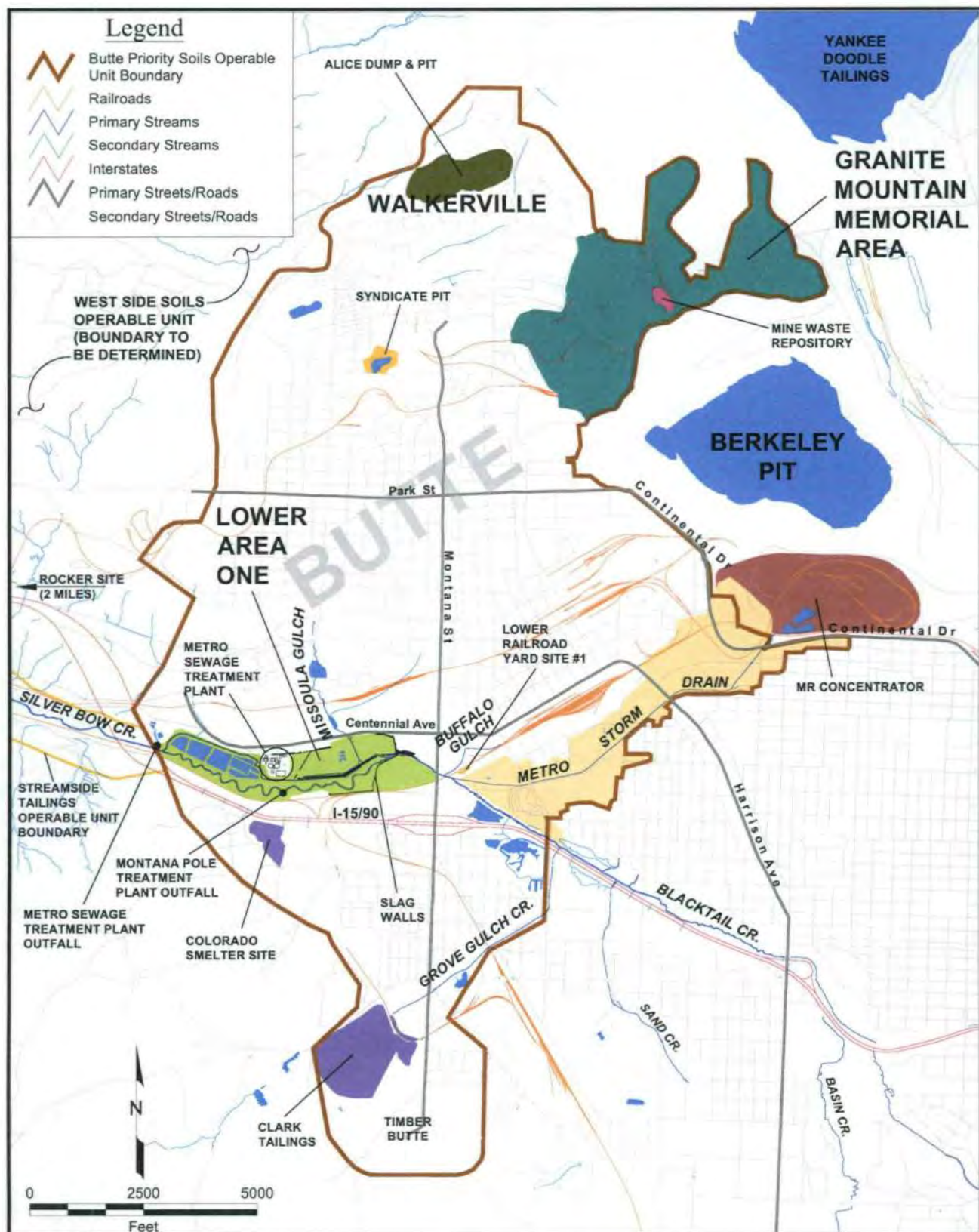




**Figure 5-2**  
**Lexington Head Frame and Mine Yard after**  
**Walkerville TCRA (Before and After)**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**







**Figure 5-3**  
**BPSOU Site Layout Map**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**





Preliminary work related to characterization and cleanup of contamination associated with railroad lines was conducted in the late-1980s and mid-1990s. With the completion of the Baseline Human Health Risk Assessment for Arsenic in 1997 (CDM 1997b) and the resultant action level for arsenic, EPA initiated the Railroad Beds TCRA.

Elevated concentrations of arsenic and lead in railroad beds are due to the use of mining-related waste materials for subgrade soil or ballast and/or from spillage from rail cars during transport of ore or ore concentrates. Unlike other BPSOU TCRAs, the Railroad Beds TCRA primarily addressed exceedances of the arsenic (rather than lead) action level.

In late 1999, a supplemental sampling effort was conducted to further refine the extent of the railroad bed contamination to be addressed as part of the response action. Of the 300 surficial railroad bed samples collected, about 75 percent exceeded the arsenic non-residential action level. The volume of rail bed material that exceeded the arsenic action level was estimated to be 300,000 cy. Construction was initiated in 2001 and was completed by the end of 2004 (Table 5-1).

The Railroad Beds TCRA reduced human health risk in Butte and environmental risks to Silver Bow Creek from railroad beds. Standard construction techniques were employed, focusing on removal or constructing barriers to waste materials to reduce erosion along rail embankments, and implementing significant improvements to the storm water drainage system.

Barriers include the use of soil covers, rock covers, and geotextile materials. Storm water improvements include emplacement of a new 60-inch storm water main and other water-routing improvements to the Butte storm water drainage system, including properly sized ditches, culverts, and retention ponds. In addition, soil removal and other improvements have been made to residential properties along active and inactive rail lines. Waste rock and other contaminated materials located within the 100-year floodplain were removed. The project is highlighted by construction of a historic preservation trail on about 4.5 miles of former rail line.

#### **5.2.2.4 Floodplain Wastes**

Silver Bow Creek is the primary stream drainage in the Butte area. Historically, the creek flowed from its origin on the continental divide in the mountains north of the BPSOU, through the area that is now the Berkeley Pit and through the Metro Storm Drain area. Prior to the onset of mining in Butte, the Silver Bow Creek floodplain (in what is now the Metro Storm Drain), was a low-lying wetland area that probably received recharge from shallow alluvial groundwater. Because it was the source of water closest to the mines on Butte Hill, numerous milling and smelting plants were constructed along Silver Bow Creek, generating an estimated total of 10 million tons of waste from 1878-1925. Although a significant portion of the smelter, milling, and concentrator wastes released to surface water were transported downstream out of the Butte area by Silver Bow Creek, a sizeable volume of wastes remained within and



adjacent to the historic stream channel and in large impoundments constructed within the floodplain and low-lying wetlands.

**Table 5-1**  
**Quantities of Contaminated Soil and Mine Waste in the OU**  
**Record of Decision**  
*Butte Priority Soils Operable Unit*  
*Silver Bow Creek/Butte Area NPL Site*

Location or Category	Volume (million cubic yards)	Comments
<b><i>Before EPA Involvement</i></b>		
Mining wastes in upland areas	7.8	Includes waste rock dumps and other wastes at historic mines, mills, and smelter sites.
Floodplain wastes	4.3	Tailings deposits and other buried wastes in Lower Area One and Metro Storm Drain
Contaminated Railbeds	0.3	
<b>Total</b>	<b>12.4</b>	
<b><i>Wastes Addressed by EPA Response Actions</i></b>		
Reclaimed upland source areas	6.9	Source areas above As or Pb action levels addressed under TCRAs, ERAs, or other actions.
Removed floodplain wastes	1.2	
Reclaimed Railbeds	0.3	Reclaimed under Railroad Beds TCRA.
<b>Total</b>	<b>8.4</b>	
<b><i>Wastes Being Considered For Future Remedial Action</i></b>		
Floodplain wastes	3.1	Approximately 1.2 million cy of waste removed from Lower Area One.
Unreclaimed Wastes	0.8	Below As or Pb action levels. May be reclaimed in the future to address storm water concerns. Includes wastes in the Granite Mountain Memorial.
Unreclaimed Source Areas*	0.1	Remaining source areas above As or Pb action levels to be addressed in the ROD.
<b>Total</b>	<b>4.0</b>	

\*Estimated in Appendix E-1 of the final FS. Pre-reclamation sampling in the OU found that 40 percent of samples collected in waste areas had lead or arsenic concentrations above action levels.

#### ***Metro Storm Drain***

The Metro Storm Drain is the geographic area within the east-central portion of the BPSOU that generally encompasses the historic (though not the current) Silver Bow Creek floodplain between Continental Drive and Blacktail Creek (Figure 5-3). The



Metro Storm Drain structure is a man-made surface water conveyance constructed during the 1930s to provide a means of transporting mine water, sewage, and storm water out of Butte. It generally follows the historic Silver Bow Creek channel. It was used by ARCO's predecessors to discharge waste and wastewater from the Berkeley Pit operation. Metro Storm Drain merges with Blacktail Creek to form Silver Bow Creek.

The Parrott Tailings impoundment in the upper portion of the Metro Storm Drain is the largest of waste deposit in the area, and is not in the current floodplain. The Parrott Tailings and other wastes have been covered by fill-dirt, including overburden, and much of the waste deposits are now under city infrastructure. Sizable deposits of waste and contaminated soils are present in the middle and lower portions of the Metro Storm Drain (Diggings East, North Side Tailings, and Lower Metro Storm Drain Tailings). Some of these deposits are within the current floodplain and some are not.

Mining wastes and contaminated soils in the Metro Storm Drain area are largely buried below the surface. For example, the Parrott Tailings are under as much as 30 feet of mining overburden in some areas. An estimated 2 million cubic yards of mining-related waste and intermixed fill material are present within Metro Storm Drain. In some places, tailings/fill material extends to depths of over 25 feet below ground surface (Parrott Tailings). A portion of these wastes is in direct contact with groundwater and serves as a primary source of contaminants to alluvial groundwater. Tailings deposits in the middle and lower reaches of the Metro Storm Drain have also been found to be significant sources of contaminants to groundwater. These sources can reliably be contained. These materials and their impacts on groundwater are discussed in more detail in Section 5.3.

A significant assortment of municipal infrastructure and private businesses now exist over the area where the mining wastes were deposited. The infrastructure and businesses include streets, railroads, city utilities, homes, Silver Lake Pipeline, parking lots, large and small private businesses such as dry cleaning, retail, restaurant, shopping center, and the City-County Shop Complex, etc. Due to the large volume of waste, the overlying infrastructure, and the lack of detailed analysis of the area, the Metro Storm Drain area and the underlying alluvial aquifer were the subject of a focused FS prepared in 2004 by EPA as a supplement to the site wide FS to evaluate various remedial options for the Metro Storm Drain.

#### *Lower Area One*

Lower Area One is located at the western portion of the BPSOU Silver Bow Creek floodplain and includes the area where the historic Colorado Tailings and Butte Reduction Works were located (Figure 5-4). This area was the site of at least four very large milling and smelting facilities, all of which contributed to the deposition of ore processing wastes and tailings. In late 1991, EPA initiated the Lower Area One ERA to address acute threats to human health and the environment from heavy metals and arsenic in surface water and groundwater.





**Figure 5-4**  
**Historic Photo of Lower Area One**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**





The removal and floodplain re-construction work (Phase I) was completed in 1998 and included the excavation of approximately 12 million cubic yards of tailings and contaminated soil from the floodplain. However, a significant volume of tailings and contaminated soils still remains at LAO, including tailings and wastes underneath the Metro Sewage Treatment Plant and the historic slag walls and aqueduct. There are also tailings and contaminated soils below the established excavation limits that were set to correspond to the bottom of the tailings and waste deposits.

Following the removal, the Silver Bow Creek channel and floodplain were reconstructed. The stream channel was reconstructed at a higher elevation to prevent contaminated groundwater from discharging to the surface water in Silver Bow Creek. The floodplain area was backfilled with clean barrow material and a diverse assortment of carefully selected plants including woody species was planted in the floodplain. A hydraulic control channel was constructed to capture contaminated groundwater. Also, four large open areas were excluded from the backfill operation in the northern portion of the site and are employed to facilitate hydraulic control and capture of groundwater. One of the four open areas was re-contoured and subdivided into six separate lagoons that are being used by the PRP Group to conduct a treatability study to test the "Treatment Lagoons in a Wetland Setting" technology. The treatability study is briefly described in Section 5.3 (Groundwater Characterization).

Phase II of the Lower Area One ERA included an extended period of groundwater and surface water equilibration during which an interim monitoring plan was implemented and completed in late 2000. Post removal groundwater monitoring indicates that groundwater COCs in the alluvial aquifer within Lower Area One remain at concentrations exceeding groundwater quality standards. For example, in the former Colorado Tailings area, the wells monitored before and after the removal showed a decrease in contaminant concentrations ranging from 10.6 percent (cadmium in GS-25) to 90.2 percent (arsenic in BMW98-4A). However, these post-removal concentrations were generally well in excess of the human health standards – in one case, 145 times greater (arsenic in BMW-2A). Many concentrations remained greater than 20 times the human health standard. None of the original concentrations exceeding standards have decreased to the extent that drinking water standards were met in the 2000 dataset.

Phase III of the Lower Area One ERA was deferred to the final remedial action that is described in this ROD. These activities include the implementation of the treatment technology for treatment of groundwater, and the final reclamation and land use planning for the entire Lower Area One site.

### 5.3 Groundwater Characterization

Alluvial groundwater and its interaction with mine wastes, contaminated soil, and surface water was the focus of the groundwater investigation for the BPSOU. Unconsolidated deposits that comprise the alluvial aquifer within the upper Silver Bow Creek drainage are found along all the larger streams and throughout the central



portion of the basin (Figure 5-5). Alluvium is composed of unconsolidated Tertiary and Quaternary aged deposits that overlie bedrock and include valley fill, landslide debris, talus, and fan gravels derived from the surrounding mountains. Within the OU, the alluvial aquifer encompasses the Metro Storm Drain area and the floodplain areas of lower Blacktail Creek, Grove Gulch Creek, and a portion of Silver Bow Creek. The thickness of the alluvium is generally greater than 200 feet in the upper Metro Storm Drain area and decreases toward the south and west to less than 30 feet within and west of Lower Area One.

The alluvial aquifer in the upper Silver Bow Creek valley is about 3.5 miles wide and 7 miles long and occupies an area of approximately 23 square miles. The lower portion of this alluvial drainage (south of Berkeley Pit) is now referred to as the Metro Storm Drain area. A significant portion of the groundwater recharge to the Silver Bow Creek watershed in BPSOU is intercepted by the Berkeley Pit and the Continental Pit (Figure 5-6). The hydrologic boundaries are shown from a different vantage point in Figure 5-7, which illustrates how the upper portion of the watershed is cut off from the Metro Storm Drain.

Alluvium pinches out towards the north, as the Butte Hill rises away from Silver Bow Creek and the Metro Storm Drain. South of Silver Bow Creek, the alluvial aquifer extends up a portion of Grove Gulch Creek in the southern portion of the OU.

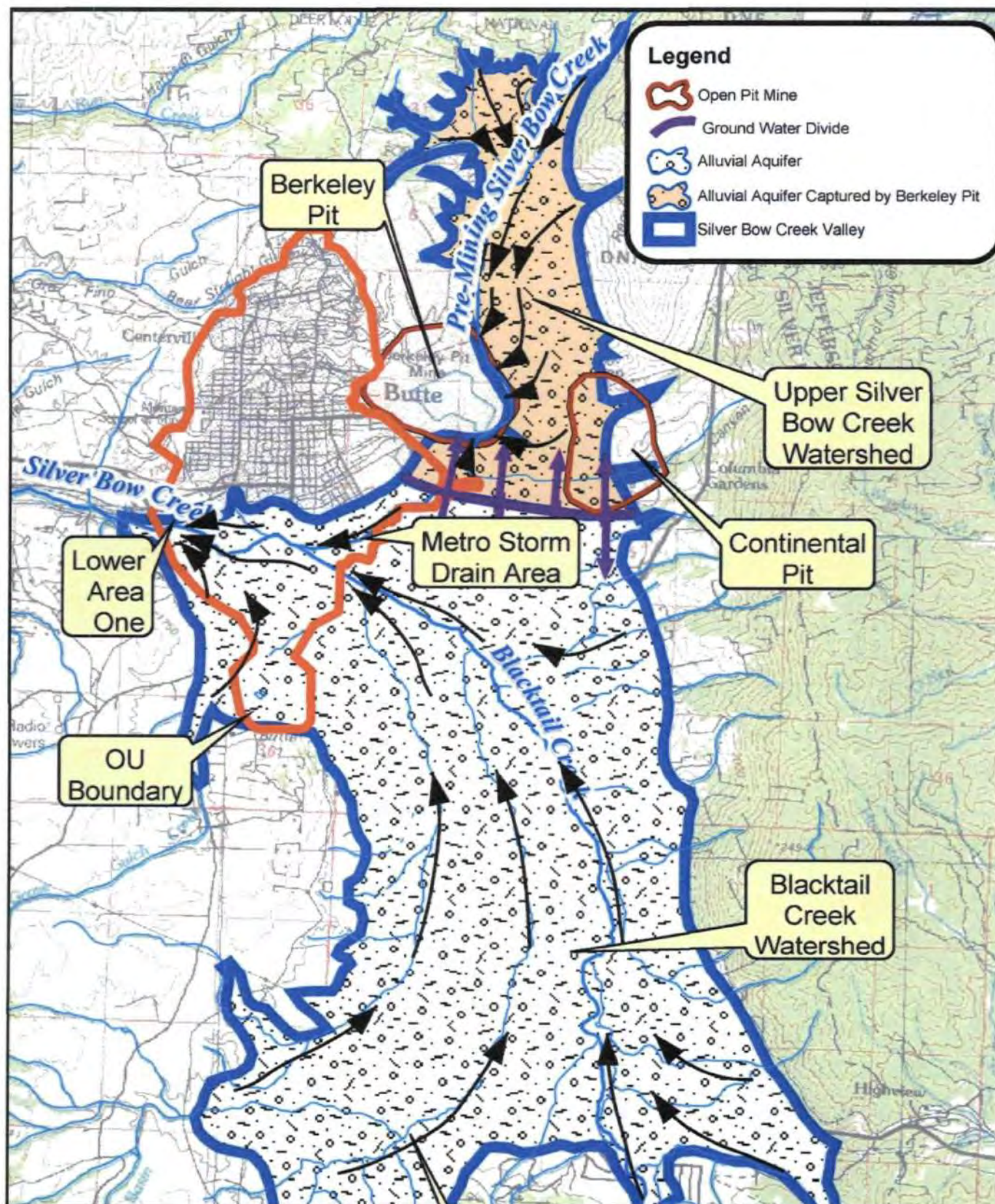
Site data (differences in hydraulic heads, water chemistry, and aquifer test data) show that the alluvial and bedrock aquifers beneath the Butte area are hydraulically distinct. Groundwater that occurs in the non-weathered granitic bedrock is associated with the underground mine workings and the Berkeley Pit system and is a component of the Butte Mine Flooding OU ROD. For these reasons, groundwater in the bedrock aquifer was not evaluated under the Butte Priority Soils RI/FS, except where it occurs within the upper weathered portion of the bedrock system and interacts directly with alluvial groundwater.

Groundwater movement in the Silver Bow Creek Valley mimics surface water movement and flows from higher elevation to lower elevation. South of Butte, groundwater flows northward away from the Highland Mountains. Flow in the historic Silver Bow Creek watershed moves from the Continental Divide toward the south-southwest. At the confluence of Blacktail Creek and the Metro Storm Drain, groundwater flow is diverted toward the west beneath Silver Bow Creek and exits the valley just west of the operable unit boundary and Lower Area One.

Near the confluence of Blacktail Creek and the Metro Storm Drain, the alluvial aquifer thins to approximately 30 feet. It continues to thin in a westward direction as the valley narrows. Immediately west of Lower Area One, at the outlet of the Silver Bow Creek valley, the width of the alluvium narrows to about 900 feet (see Figure 5-6). The alluvial deposits in this narrow region are less than 20 feet thick.

The reduction in lateral extent and thickness of the alluvium near the west end of the OU greatly decreases the cross-sectional flow area of the alluvial system, resulting in a

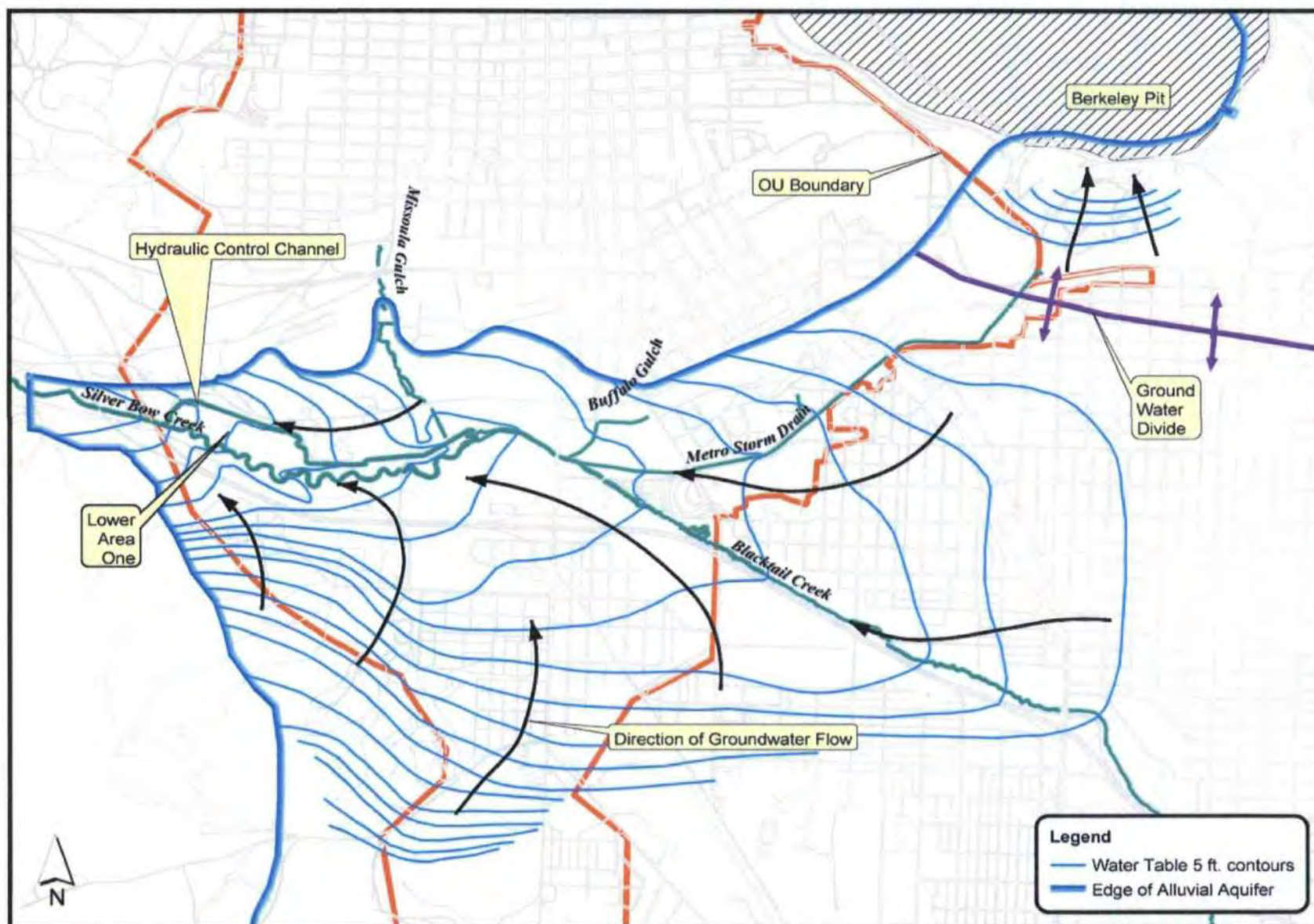




**Figure 5-5**  
**Upper Silver Bow Creek Valley Alluvial**  
**Aquifer**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**



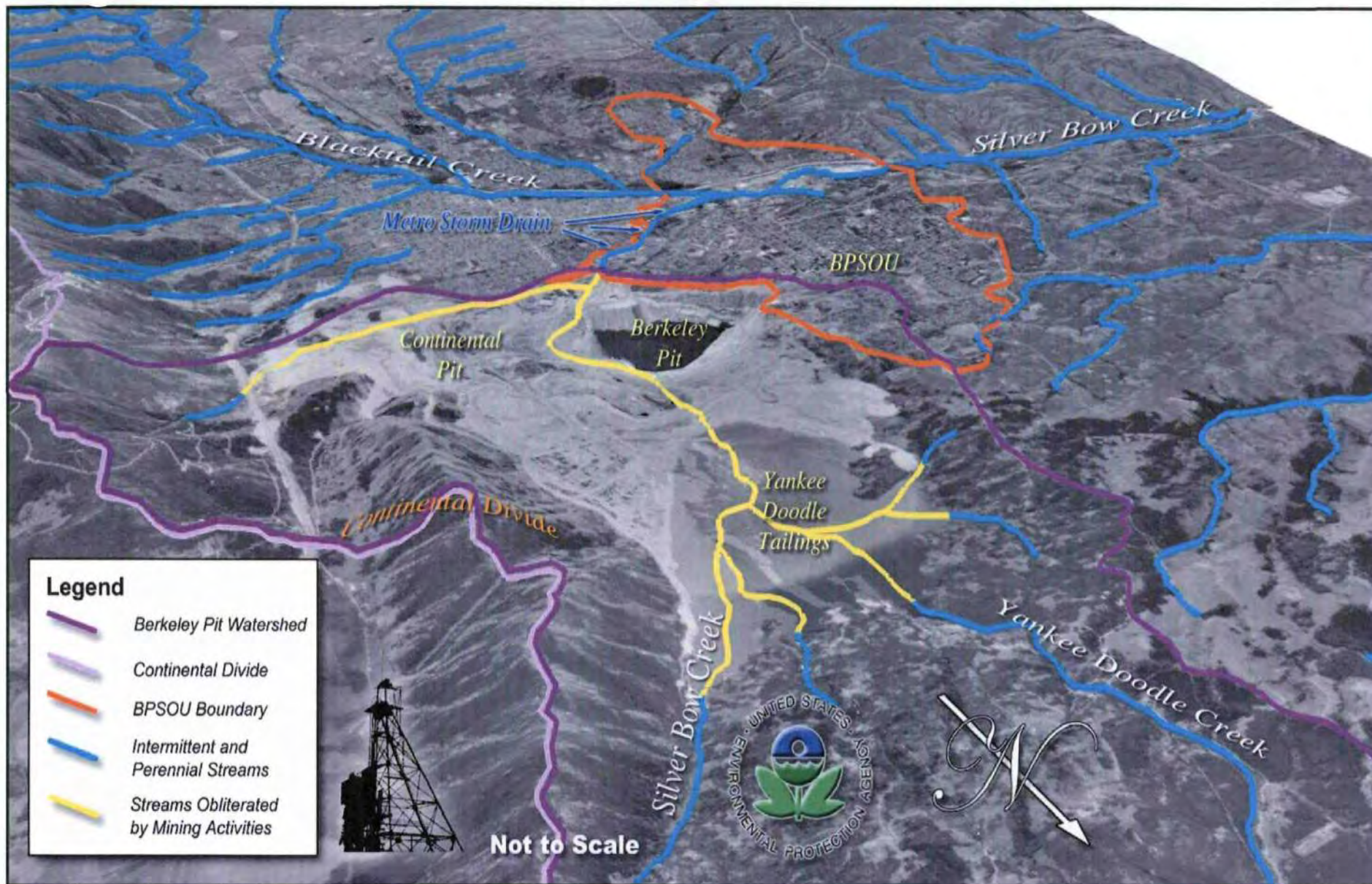




**Figure 5-6**  
**Potentiometric Surface Map of the Alluvial**  
**Aquifer**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**



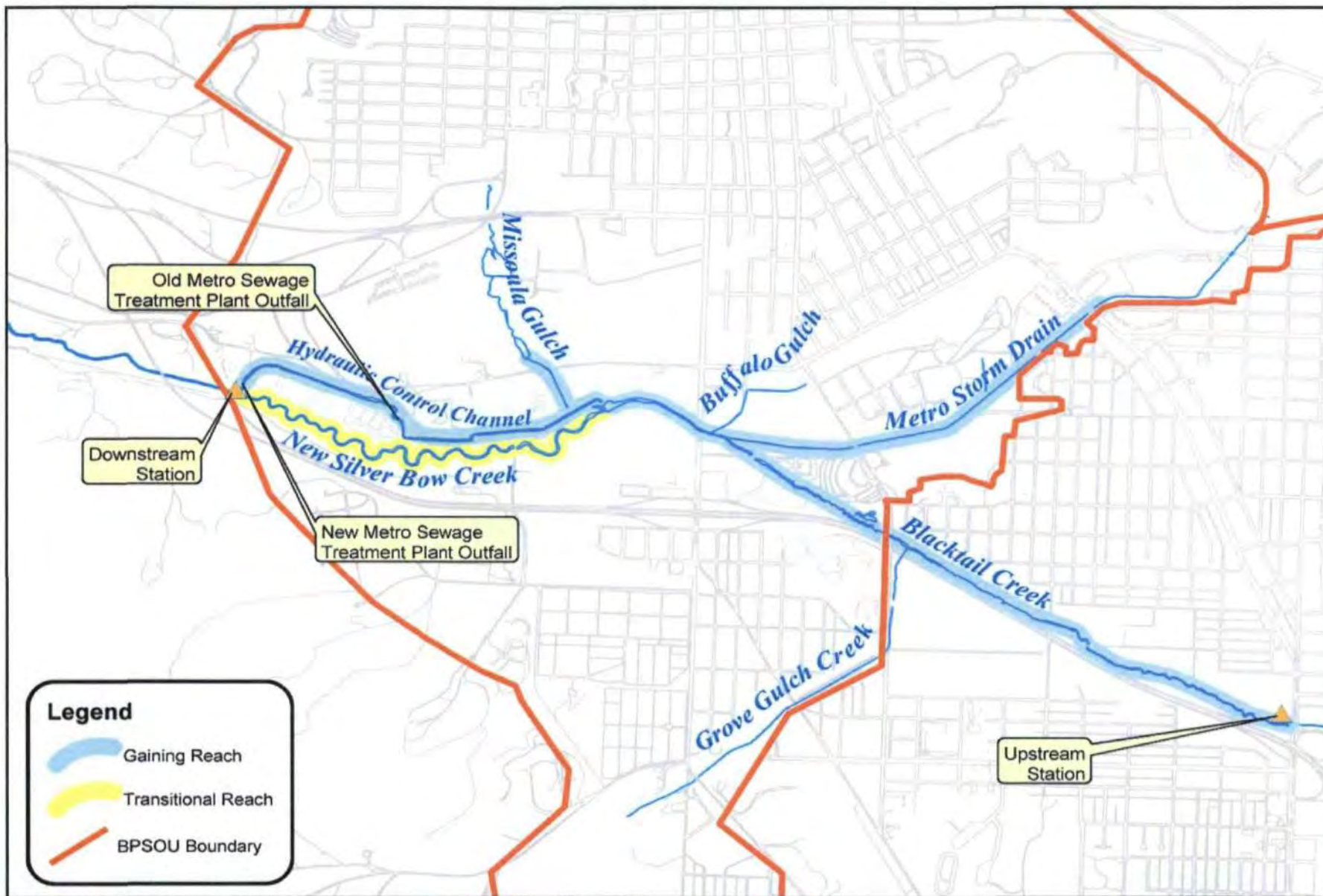




**Figure 5-7**  
**Hydrologic Boundaries and Surface Water Features**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**







**Figure 5-8**  
**Key Surface Water Sampling Locations**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**





"neck" through which only a very small flux of alluvial groundwater can exit the basin. The reduction in cross-sectional flow area causes much of the alluvial groundwater to discharge to the lower reaches of Blacktail Creek, the Metro Storm Drain, and Silver Bow Creek. Measured gains and losses over these surface water reaches (key surface water monitoring stations are shown in Figure 5-8) support the conclusion that most of alluvial groundwater in the portion of the Silver Bow Creek basin located within the BPSOU boundary discharges to surface water and leaves the basin as surface water flow in Silver Bow Creek.

This decrease in cross sectional area of the alluvium at the west end of Lower Area One enhances the effectiveness of the groundwater capture system. Prior to installation of the groundwater capture system at Lower Area One, underflow beneath Silver Bow Creek at the valley outlet was estimated at less than 150 gallons per minute (gpm) (Hydrometrics 1990). Since the groundwater collection system began operation in 1998, the flux of groundwater that exits the upper Silver Bow Creek Valley is less than 6 gpm (PRP Group 2002).

### 5.3.1 Hydrogeologic Data

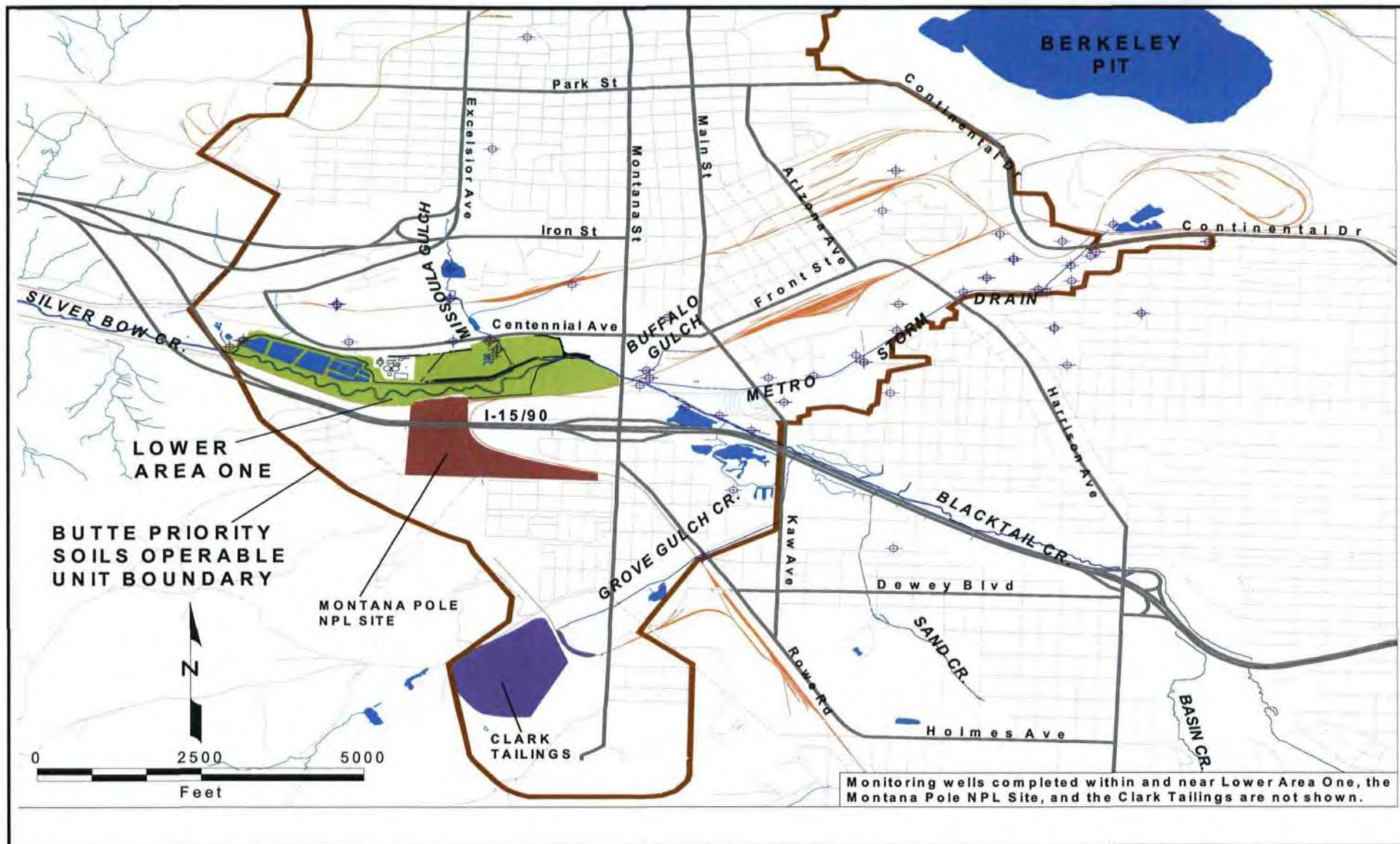
Within the OU, the alluvial aquifer has been extensively characterized. Approximately 200 wells and soil borings have been completed in the alluvial aquifer. Data collected from these wells and geophysical investigations were used to evaluate the lithologic and hydraulic character of the alluvial aquifer. A subset of 65 wells was included in the monitoring well network (Figure 5-9) and these wells have provided a large quantity of hydrogeologic data on the alluvial groundwater system. This includes long-term water level measurements and information on aquifer characteristics obtained from pumping and slug testing.

Potentiometric data indicate that groundwater flow from the Blacktail Creek floodplain (upper Silver Bow Creek valley), the Metro Storm Drain, and the Silver Bow Creek floodplain converges in the vicinity of Lower Area One (Figure 5-6). Small quantities of groundwater flow enter the floodplain system from subdrainages on the Butte Hill (e.g., Missoula Gulch, Buffalo Gulch).

A drainage divide in the alluvial groundwater system is present south of the Berkeley Pit and is attributable to the "cone of depression" caused by dewatering operations in the pit area. Groundwater north of this divide flows toward the pit. South of the divide, groundwater flows southward toward lower Metro Storm Drain and Silver Bow Creek. This groundwater divide will be maintained as a condition of the Butte Mine Flooding OU ROD to control migration of contaminated water in the Berkeley Pit and underground mine workings.

Groundwater quality in the alluvial corridor south of the divide is severely degraded. Elevated levels of groundwater COCs are concentrated in this corridor of the alluvial aquifer. Contaminant concentrations are highest in the upper Metro Storm Drain and in Lower Area One.





**Figure 5-9**  
**Butte Priority Soils OU Monitoring Wells**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**





### 5.3.2 Lower Area One

Prior to the implementation of Phase I of the LAO ERA, this area was characterized by mining, smelting, and milling waste deposits, stockpiles of manganese ore and manganese slag walls used to segregate waste accumulations from the channel of Silver Bow Creek, and several tailings impoundments (Figure 5-4). The largest of these impoundments was the Colorado Tailings. These impoundments held an estimated 2.2 million cubic yards of mining related wastes (Table 5-1).

Initial characterization of groundwater quality in Lower Area One was performed in the late 1980s and early 1990s and indicated that alluvial groundwater was severely degraded and had a significant impact on surface water quality in Silver Bow Creek. The Colorado Tailings and other waste materials in Lower Area One were partially saturated with groundwater (Figure 5-10) and this resulted in significant contaminant loading to Silver Bow Creek.

The magnitude of groundwater contamination at Lower Area One before the implementation of Phase I of the ERA is illustrated on Figure 5-11. As discussed earlier in this section, Phase I entailed excavating and removing significant quantities of tailings and contaminated soils, backfilling with clean fill, restoring the Silver Bow Creek channel, and constructing a hydraulic control channel.

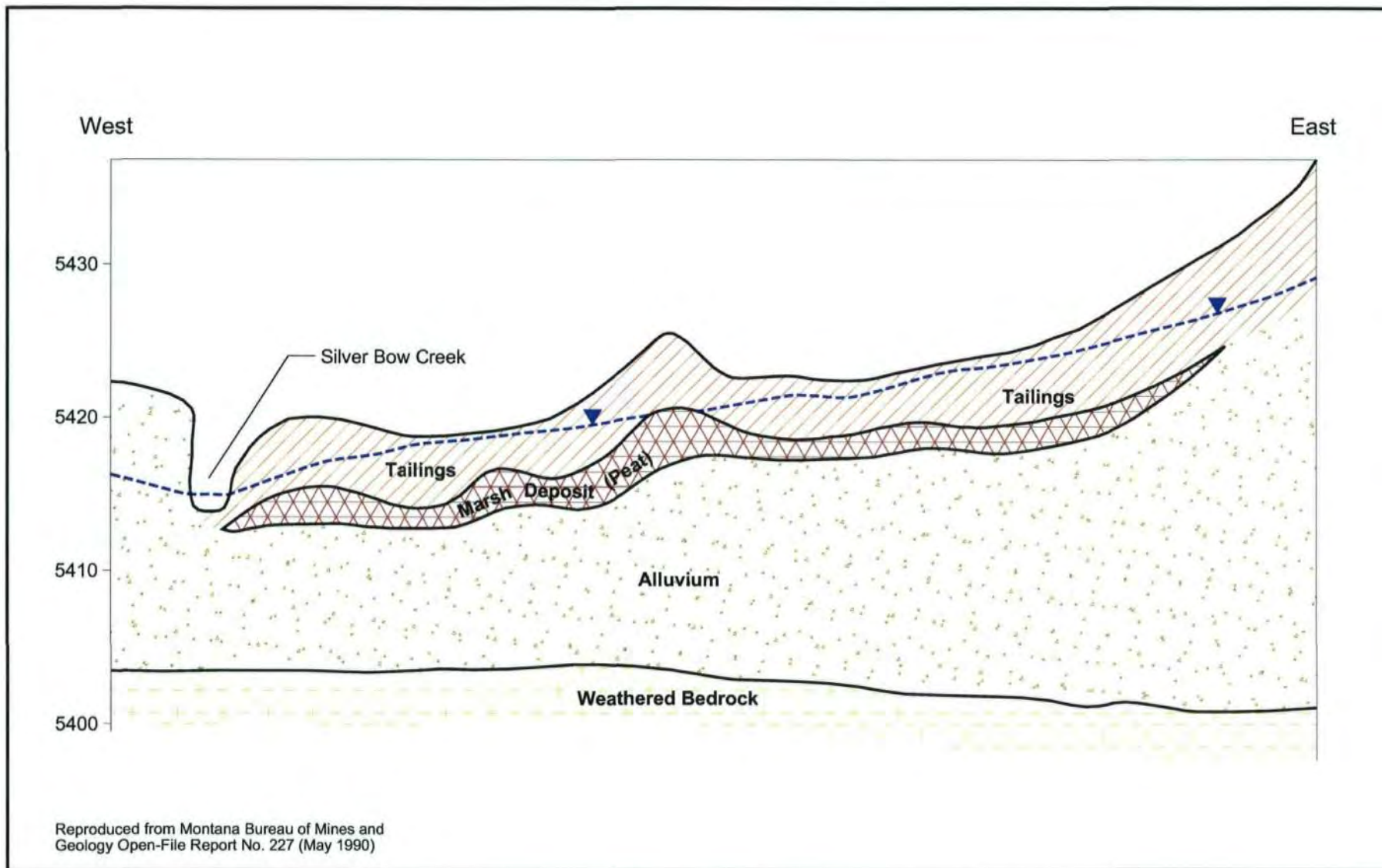
Contemporary site features at Lower Area One are shown on Figure 5-12. Groundwater remains contaminated in Lower Area One due to leaching of metals from inaccessible tailings and other wastes that remain in the area (Figures 5-13 a, b and c show cadmium, copper, and zinc as examples). However, current hydraulic controls prevent contaminant loading to Silver Bow Creek and allow for the capture and eventual treatment of groundwater (Figure 5-14).

#### 5.3.2.1 Treatability Study at Lower Area One

Since completing Phase I of the ERA (waste removal and reconstruction of Silver Bow Creek floodplain) in 1998, the PRP Group has performed a treatability study in Lower Area One to assist in the selection of groundwater treatment methods for the BPSOU. A detailed description of the treatability study is presented in Appendix D of the Final Feasibility Study Report (PRP Group 2004).

The study was conducted in a series of three unlined lagoons that were constructed within one of the larger open areas that remained un-backfilled following the removal of the Colorado Tailings (see Figure 5-12). An additional parallel set of three lagoons was constructed in 2001 to increase capacity, supplement treatment in the original lagoons, and for independent use when maintenance is required on the original lagoons. The treatment system is designed to treat contaminated groundwater captured by the Lower Area One hydraulic control channel and open water areas, as well as water diverted from the West Camp system of the Mine Flooding OU. The treatment system uses lime addition to modify the pH and chemistry of influent water to reduce metal solubility. Treatment within the lagoon system is accomplished primarily by lime precipitation. Additional biological or "wetland-type" treatment

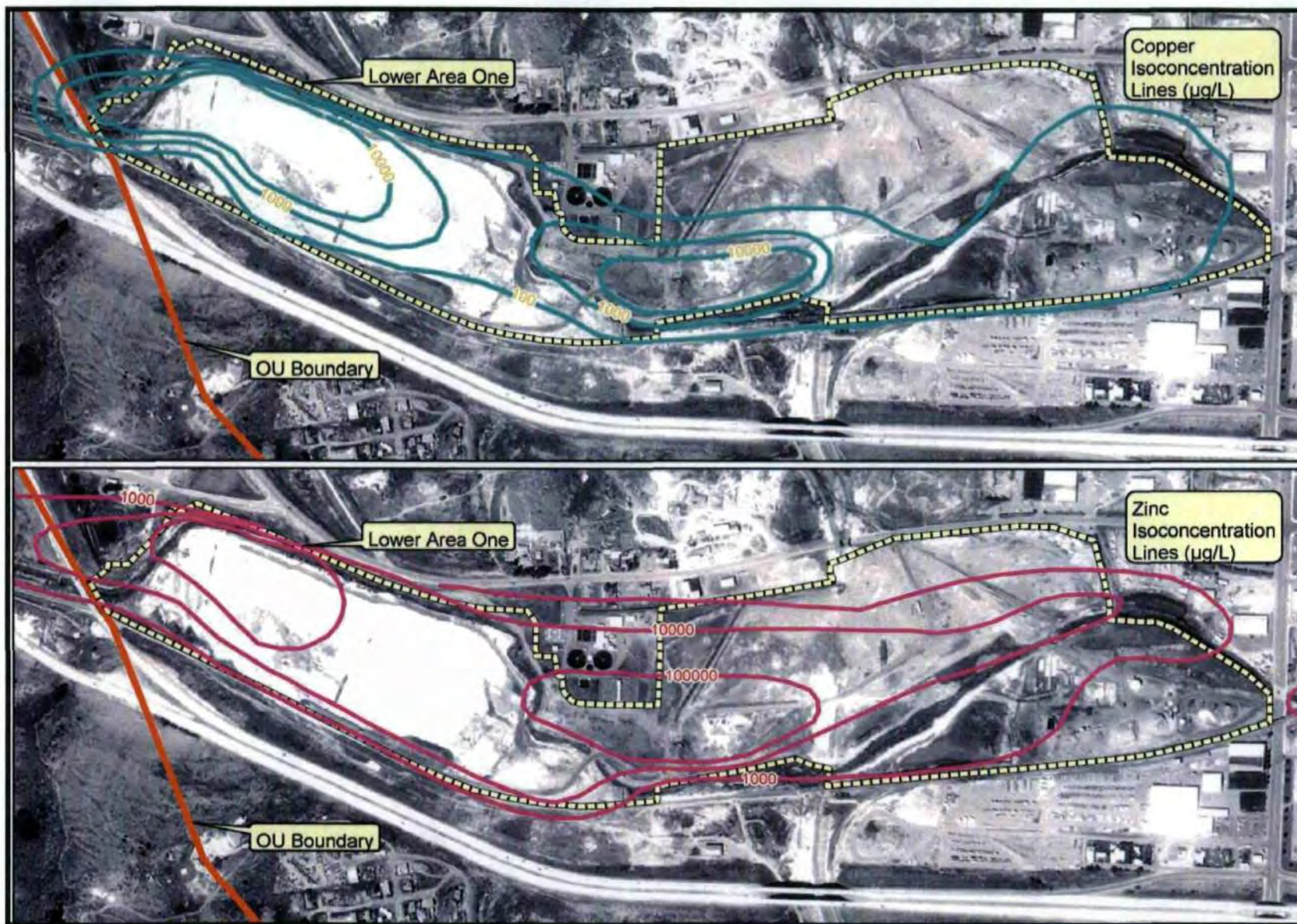




**Figure 5-10**  
**Pre-removal Profile of the Colorado Tailings**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**







**Figure 5-11**  
**Pre-removal Copper and Zinc Distribution in Lower**  
**Area One Groundwater**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**







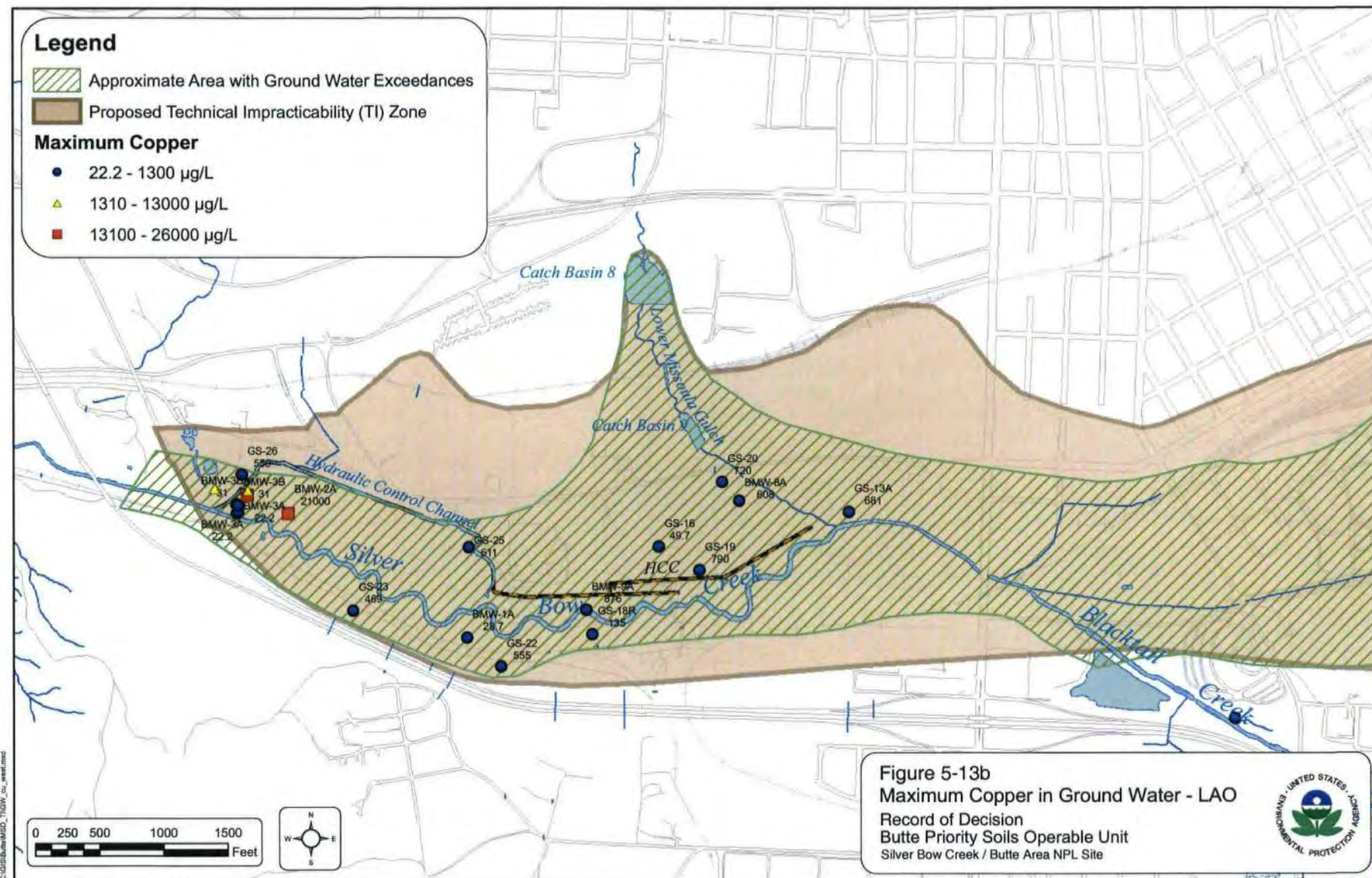
**Figure 5-12**  
**Lower Area One Post-Removal Features (2002 photo)**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**



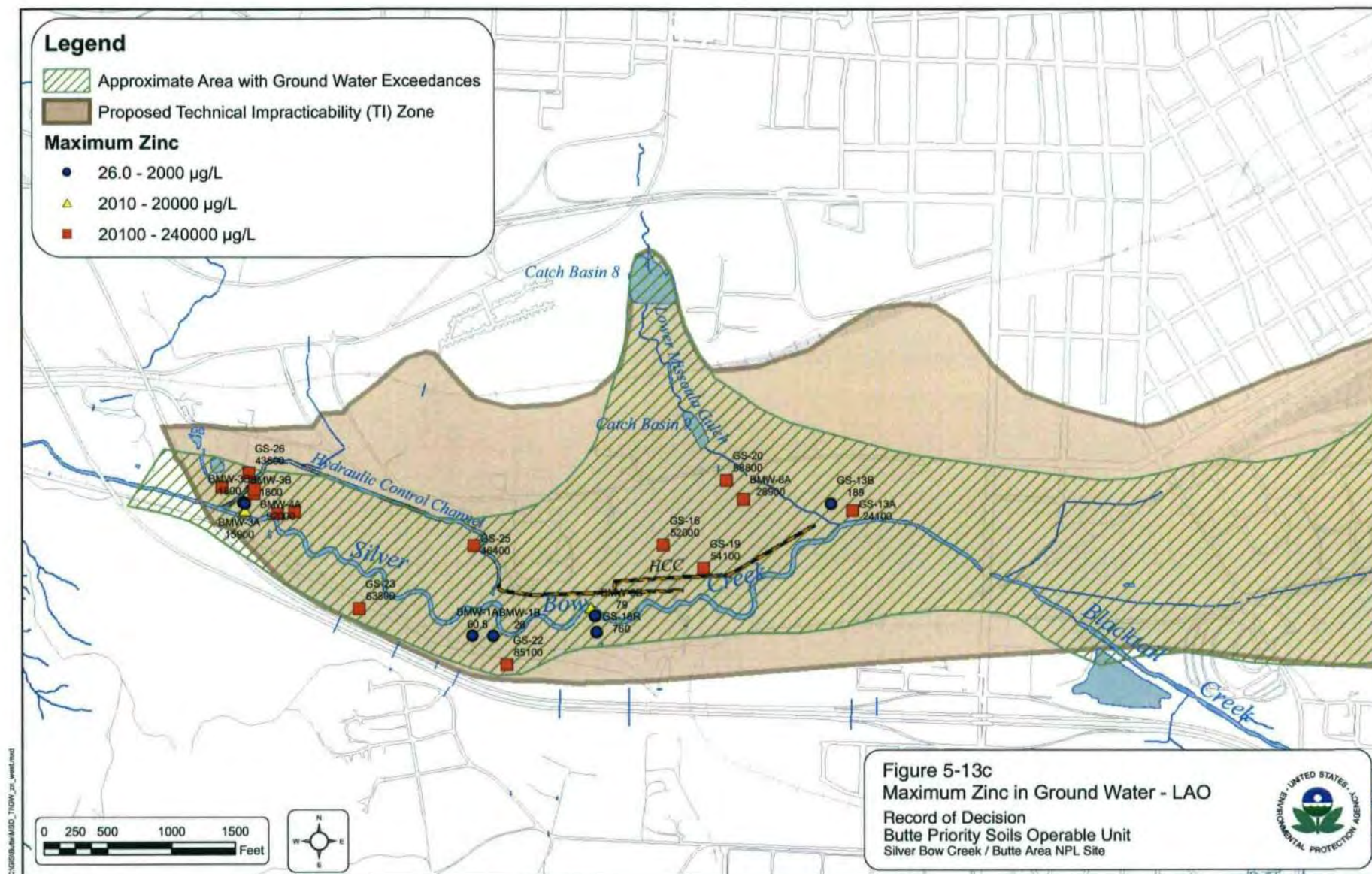




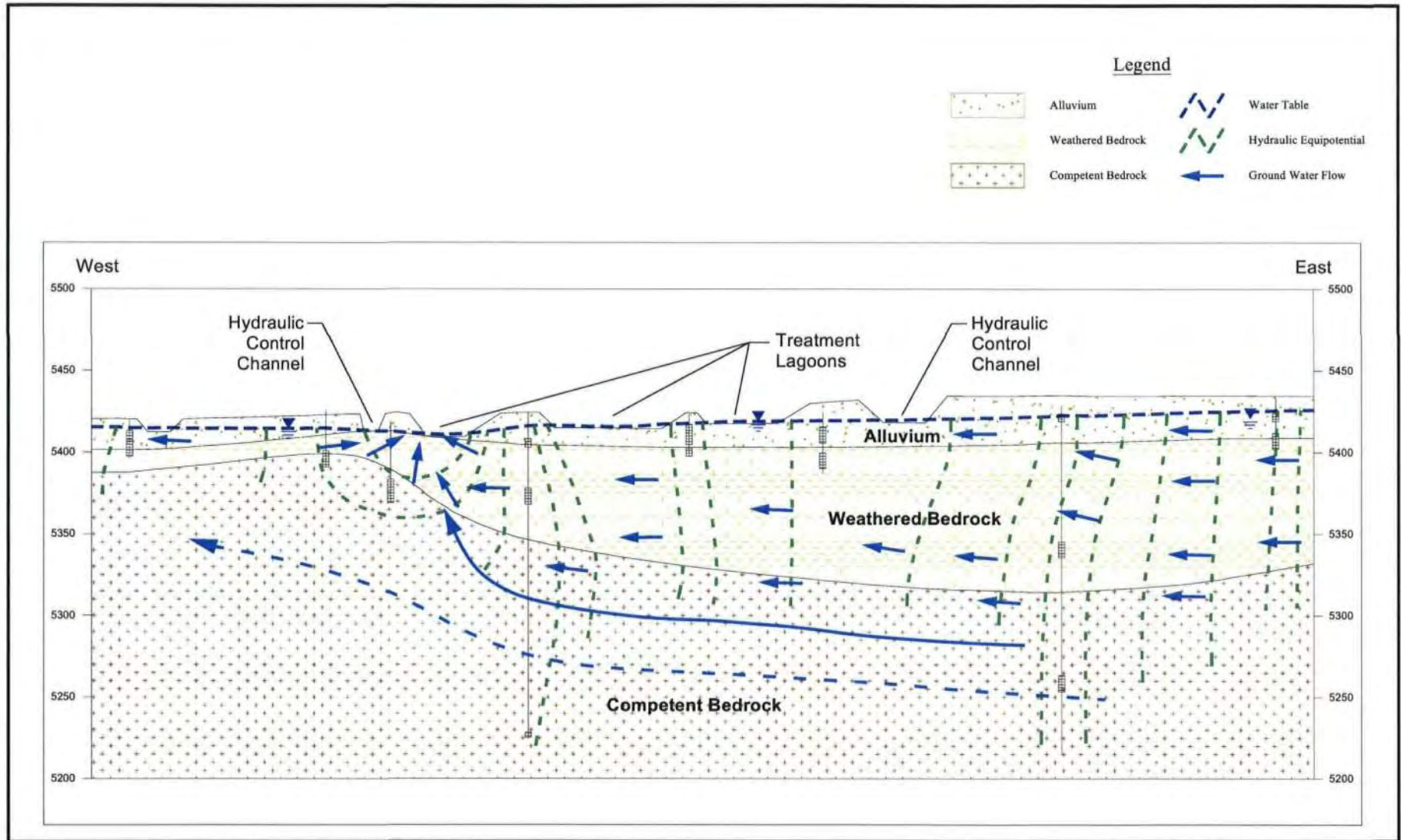












**Figure 5-14**  
**Lower Area One Groundwater Capture Profile**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**





effects were demonstrated to be minimal, particularly during the winter months. The study showed that the lagoon system was generally capable of effectively treating influent waters to achieve discharge standards (Montana DEQ-7 standards) during periods of normal operation.

### 5.3.3 Metro Storm Drain

The thickness of the alluvial aquifer is greater than 250 feet beneath the upper Metro Storm Drain and thins to approximately 25 feet near the confluence of Metro Storm Drain and Blacktail Creek (Figure 5-15). Alluvium within the Metro Storm Drain is comprised of poorly sorted sand, gravel, silt, and clay of low to moderate permeability. Generally, the aquifer is coarser and more permeable in the shallow portion of the aquifer (above 70 to 80 feet) than it is at depth.

Near land surface, the Metro Storm Drain area is predominantly reworked fluvial sediments and fill material (including waste rock, slag, tailings, demolition debris, and old dump material) ranging in thickness from a few feet to over 25 feet. Buried tailings in the upper Metro Storm Drain area are the remnants of tailing impoundments constructed for wastes generated predominantly by the historic Parrott Smelter. The most notable waste deposits in the lower Metro Storm Drain are referred to as the North Side and the Diggings East Tailings (Figure 5-16).

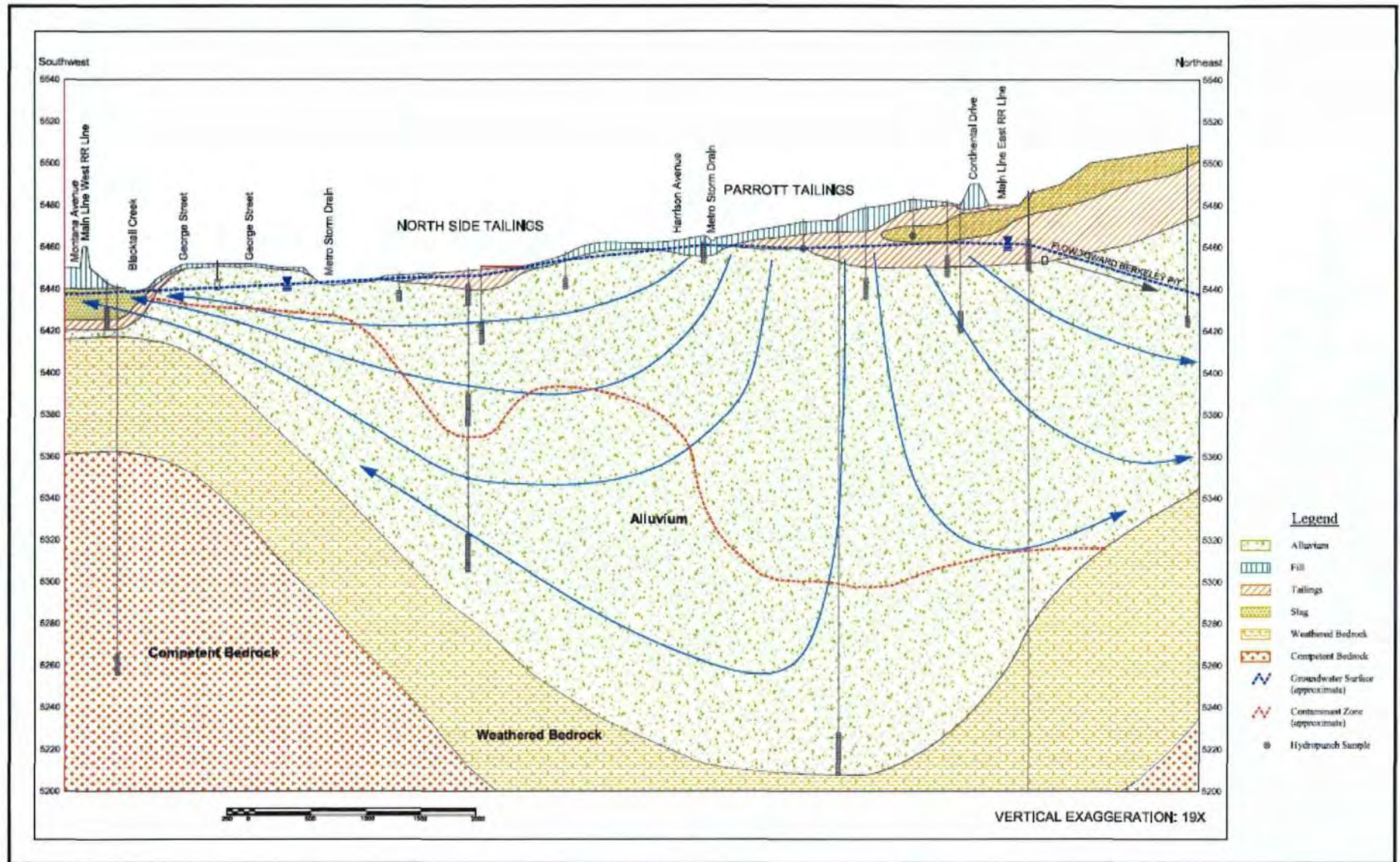
The alluvial aquifer in the Metro Storm Drain area receives recharge primarily from precipitation, snowmelt, and runoff from the Butte Hill. The groundwater cone of depression created by the Berkeley Pit intercepts and contains groundwater in the alluvial and bedrock aquifers north of the Metro Storm Drain area (Figures 5-6 and 5-7).

Minor recharge may be received from the east in the upper Metro Storm Drain; however, most of the flow from the east is diverted southward toward Blacktail Creek prior to entering the Metro Storm Drain area. The groundwater divide is a broad area with a nearly flat water table surface that extends over much of the upper Metro Storm Drain area. In lower Metro Storm Drain, the water table slopes toward the southwest at an average horizontal hydraulic gradient of approximately 0.4 percent.

In the middle reaches of the Metro Storm Drain, shallow groundwater flow generally parallels the channel and discharges to the channel in the lower Metro Storm Drain area. A water balance evaluation performed during the RI (PRP Group 2002) demonstrated that the calculated flux through the alluvial aquifer in the Metro Storm Drain is essentially accounted for by the average base flow (0.3 cfs). This suggests that nearly all groundwater within the upper and middle Metro Storm Drain is expressed as surface water in the lower reaches of the Metro Storm Drain channel.

Groundwater in the Metro Storm Drain area is severely impacted by buried and fluvially deposited mining wastes throughout the Metro Storm Drain, including the historic Silver Bow Creek floodplain. Impacts are most apparent beneath and down gradient of the Parrott Tailings, North Side Tailings, and Diggings East Tailings (Figures 5-17 a, b, and c show cadmium, copper, and zinc concentrations as





**Figure 5-15**  
**Profile of Alluvial Aquifer in Metro Storm Drain**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**



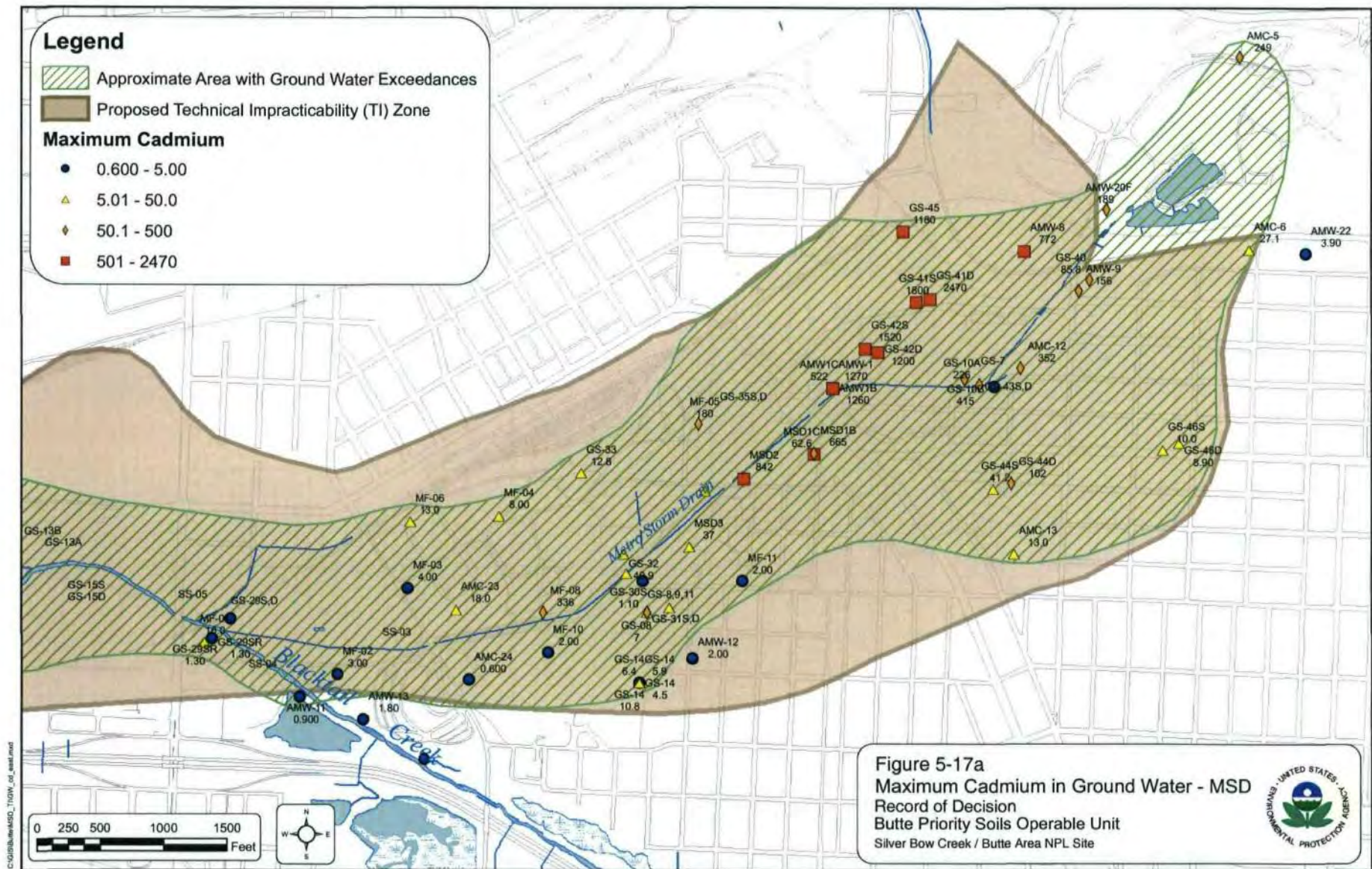




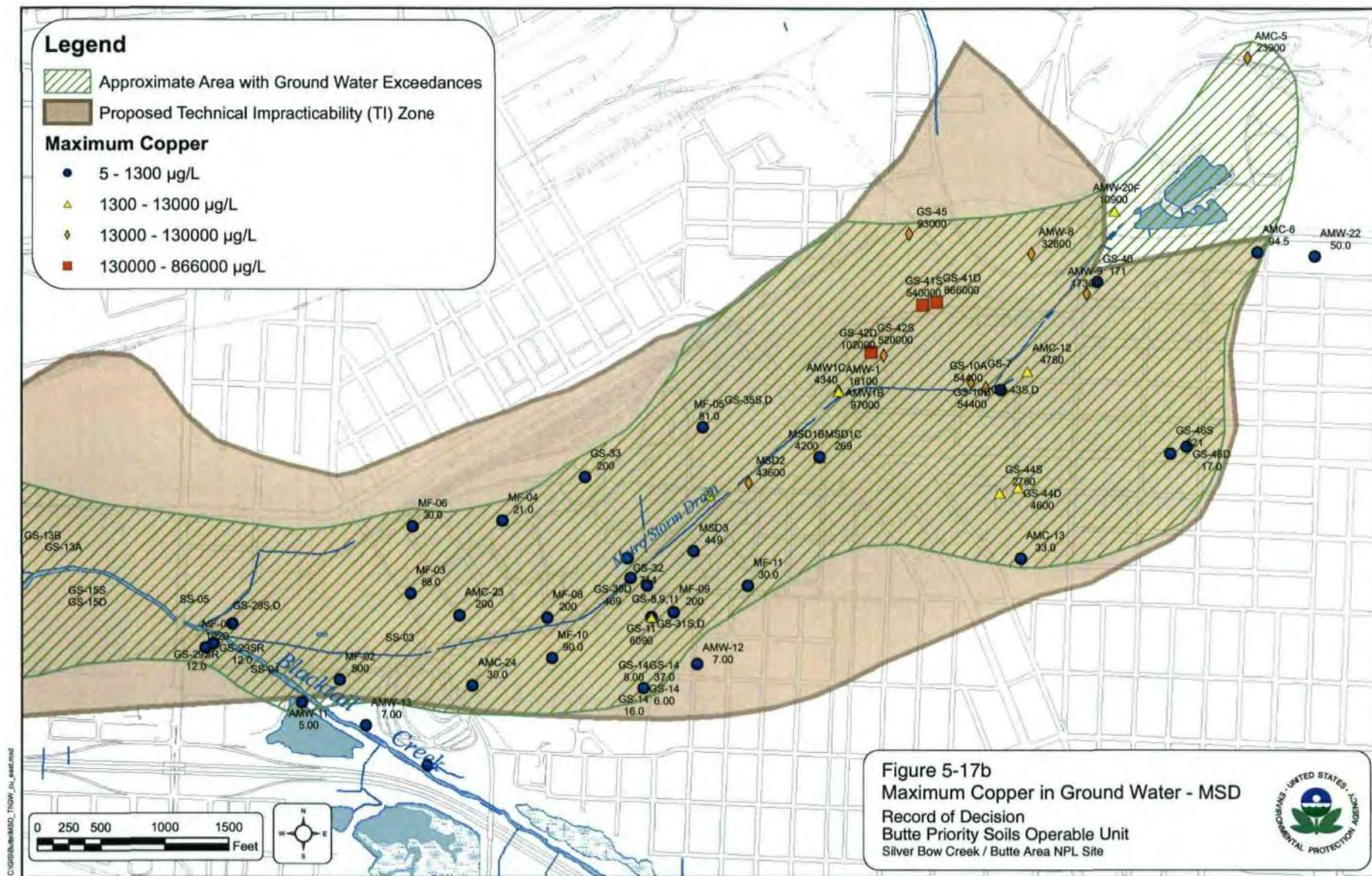
**Figure 5-16**  
**Waste Materials in Metro Storm Drain**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**



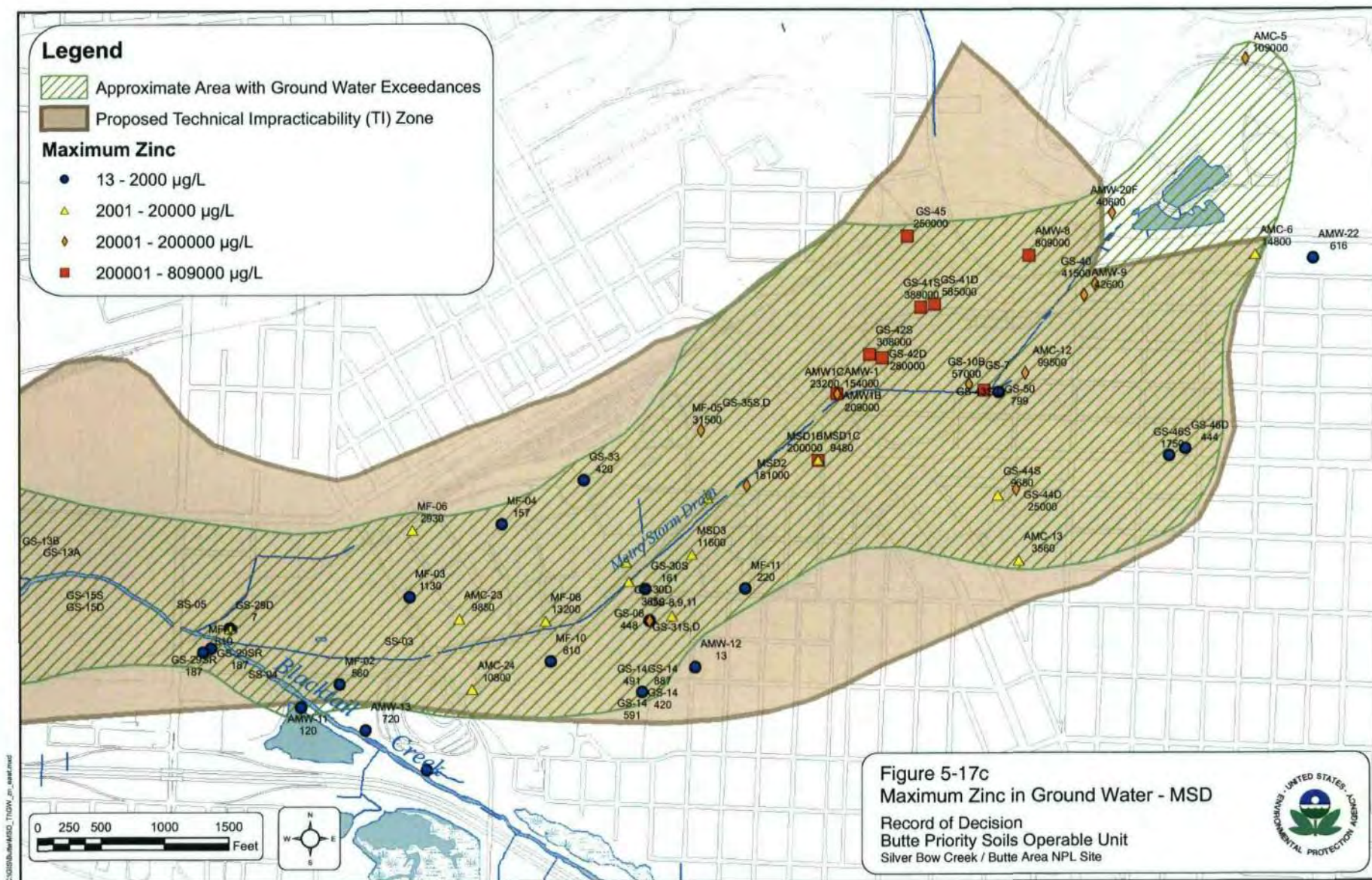














examples). Contaminant concentrations in these areas exceed applicable water quality standards, in some cases by several orders of magnitude. Impacts to groundwater quality are apparent in the lower Metro Storm Drain area, but they are not as widespread or concentrated as in the middle and upper reaches of the Metro Storm Drain.

Beneath the Parrott Tailings, groundwater quality is impacted to a depth of at least 150 feet. Beneath the Diggings East Tailings, contamination reaches to depths of at least 70 feet. Since the alluvial aquifer thins toward the west (only 25 feet), impacts to alluvial groundwater in lower Metro Storm Drain are relatively shallow.

Groundwater flow paths in the upper Metro Storm Drain area are typical of a groundwater divide. The water table is nearly flat over a broad area. As a result, lateral groundwater movement is very slow. The predominant direction of groundwater flow in the upper Metro Storm Drain is downward, and vertical gradients are downward at approximately 3 to 5 percent.

Beneath the groundwater divide, downward vertical flow diverges, with some flow directed toward the Berkeley Pit (north-northeast) and some flow directed toward lower Metro Storm Drain and Silver Bow Creek (south-southwest). Southwestward directed flow is forced back toward the ground surface in the lower Metro Storm Drain as a result of the thinning of the alluvial aquifer. Thus, deep circulating groundwater originating in upper Metro Storm Drain travels to depth before eventually rising back toward ground surface in the middle and lower reaches of the Metro Storm Drain (Figure 5-15).

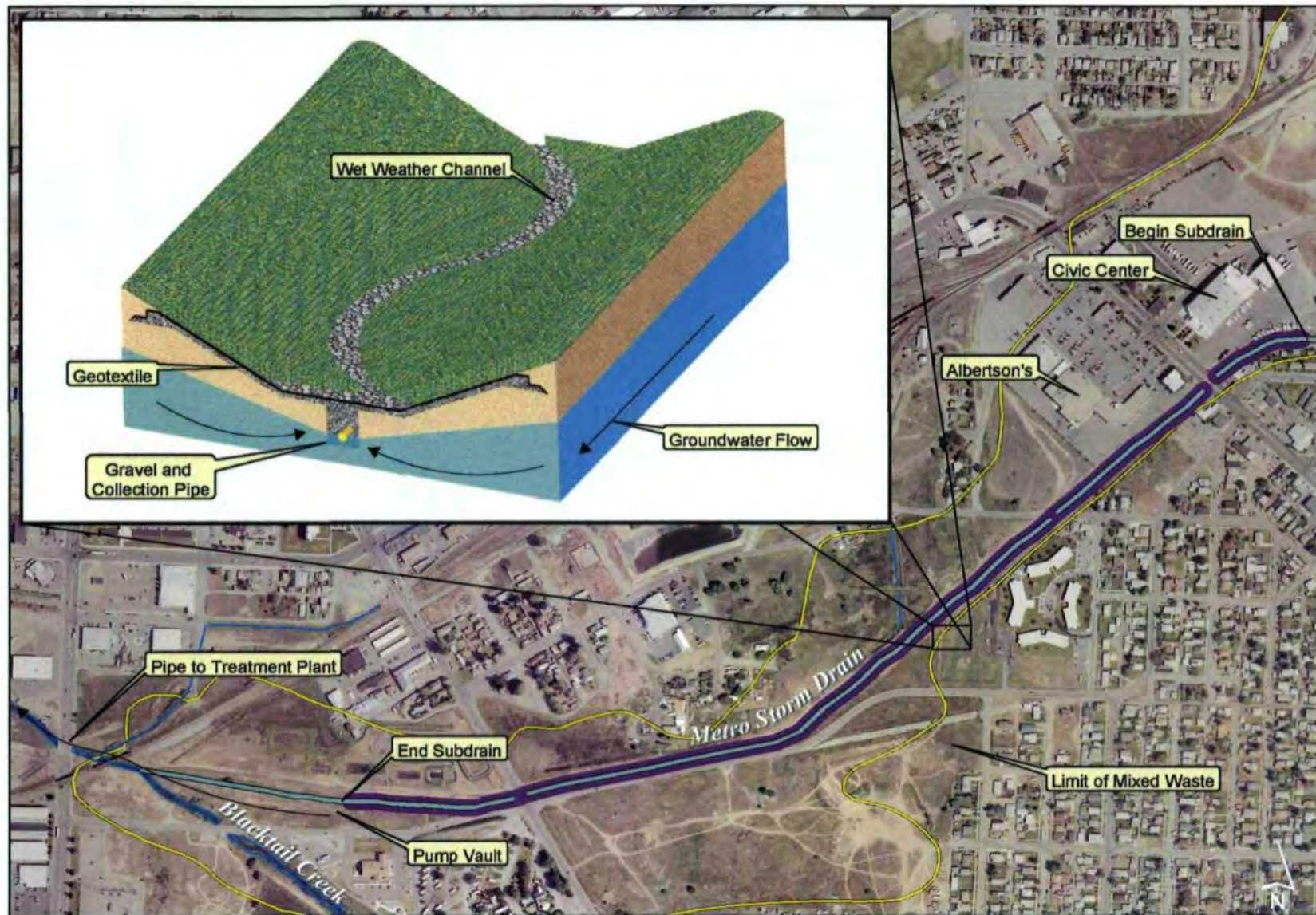
Fate and transport calculations indicate that contaminant migration in the alluvial aquifer is also very slow in the Metro Storm Drain. Groundwater travel times along flow paths from the upper area beneath the Parrott Tailings to the middle and lower reaches are on the order of 100 years. Considering attenuation, the movement of contaminants is even slower.

Hydrogeochemical analyses demonstrate that contaminants observed in shallow groundwater discharging to the channel in lower Metro Storm Drain are a product of leaching from the North Side and Diggings East Tailings and not the Parrott Tailings. Eventually, contaminants from the Parrott Tailings area in upper Metro Storm Drain will reach lower Metro Storm Drain, but it is estimated that this would take a period of at least 200 years.

#### **5.3.3.1 MSD Subdrain**

In 2003, as directed by EPA, acting under the Consent Decree for the Butte Mine Flooding OU, ARCO conducted excavation along the Metro Storm Drain channel to install a pipeline to convey effluent from the Horseshoe Bend/Berkeley Pit Treatment Plant. To prevent having to re-excavate the area for the purposes of groundwater response actions, a subsurface groundwater collection system (subdrain) was installed along the path of the old Metro Storm Drain channel and the channel was reconstructed over the subdrain to convey wet weather flows (Figure 5-18). This





**Figure 5-18**  
**Metro Storm Drain Subdrain**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**





subdrain captures groundwater that formerly discharged to the Metro Storm Drain channel (base flow) and conveys it to a pump vault where it has and will be conveyed to Lower Area One. The final design and construction of the BPSOU remedy will entail further evaluation and design of this system, including routing of the captured Metro Storm Drain base flow to a groundwater treatment system, designed for treating groundwater captured from both Metro Storm Drain and Lower Area One to DEQ standards in perpetuity (see Section 8, Table 8-2). The performance of the design will be evaluated during the required five-year reviews.

## 5.4 Surface Water Characterization

The Butte area was listed as a Superfund site largely due to water quality issues associated with Silver Bow Creek. Data collected in the 1980s and early 1990s demonstrated elevated metals concentrations in Silver Bow Creek during base flow and storm flow conditions. The water quality was poor and failed to meet state water quality standards.

Silver Bow Creek now begins at the confluence of the Metro Storm Drain and Blacktail Creek. The Metro Storm Drain was constructed by realigning and filling the original Silver Bow Creek channel, a low-lying swampy area with numerous mine waste impoundments. The upper portion of Metro Storm Drain is dry except during storm runoff or snowmelt episodes. The lower portion receives flow via groundwater discharge during normal flow conditions and, up until the construction of the subrain in 2004, the MSD contributed between 0.3 and 0.5 cubic feet per second (cfs) to Silver Bow Creek.

The primary source of flow in Silver Bow Creek is inflow from Blacktail Creek, which normally contributes 11 to 15 cfs. The Metro Storm Drain and current Silver Bow Creek floodplain also receive flow from sub-basins on the Butte Hill (Figure 5-19). Except for the lower Missoula Gulch sub-basin, discharge from the Butte Hill occurs only during storm runoff and snowmelt events. The Lower Missoula Gulch sub-basin intercepts shallow groundwater and maintains a base flow of 0.1 to 0.3 cfs.

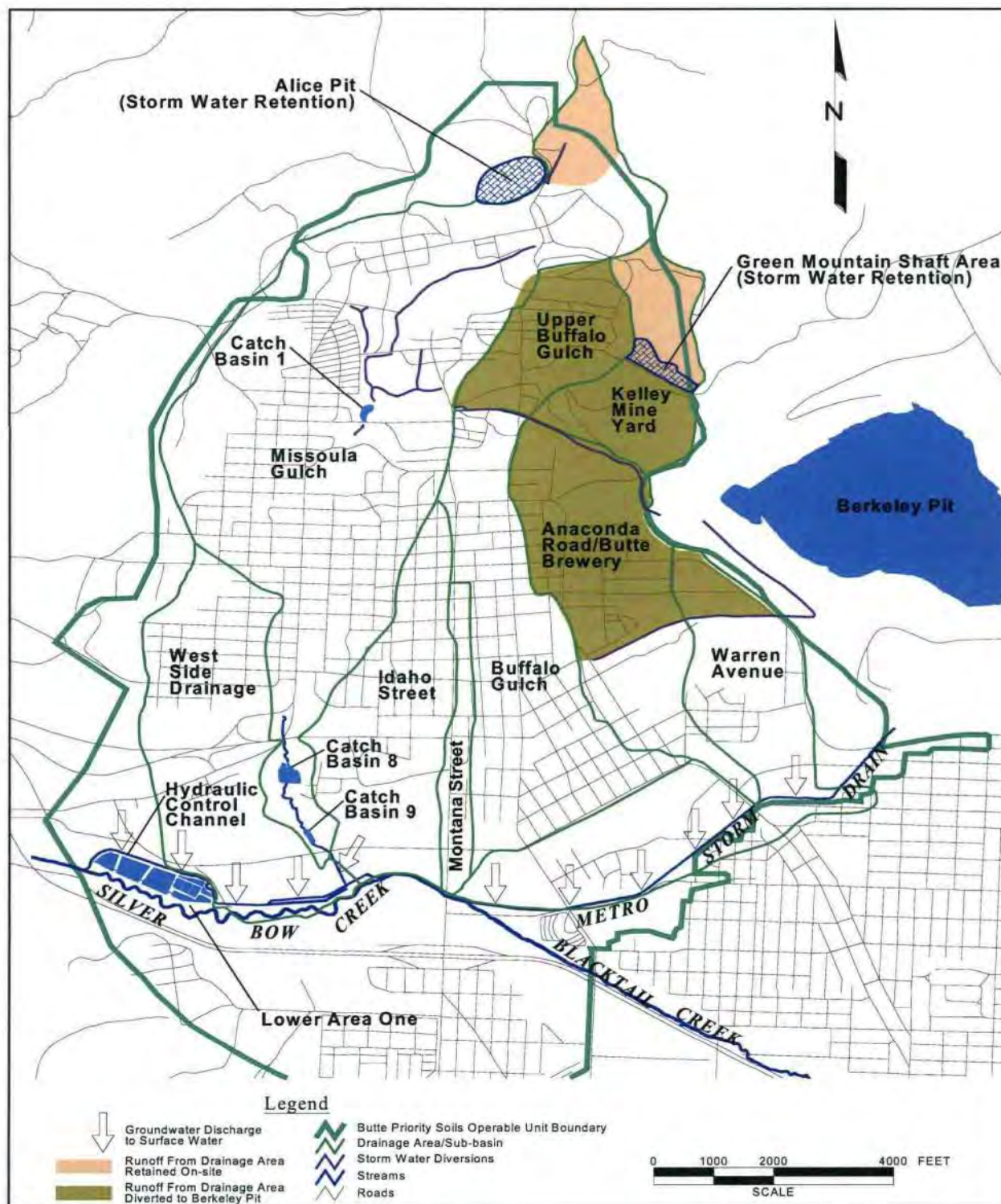
Perennial stream flow also occurs in Grove Gulch south of Silver Bow Creek. Grove Gulch Creek discharges flow to Blacktail Creek upstream of its confluence with Metro Storm Drain. Normal base flow near the mouth of Grove Gulch is less than 0.2 cfs.

In addition to the perennial flow and storm water runoff, Silver Bow Creek receives regulated discharge from the Metro Sewage Treatment Plant (see Figure 5-12). Discharge from the plant is normally between 5 and 9 cfs, constituting roughly 30 percent of the total base flow in Silver Bow Creek.

Major contributors of metals to Silver Bow Creek, during periods of base flow, were:

- Surficial tailings in Lower Area One (through which Silver Bow Creek flowed prior to 1997). These were largely removed during the Lower Area One ERA.





**Figure 5-19**  
**Butte Hill Storm Water Drainage Basins**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**





- Groundwater contaminated by the Colorado tailings (at Lower Area One) expressed directly as surface water to Silver Bow Creek. Capture and treatment of this groundwater has been ongoing as part of the treatability study.
- Metals laden sediment deposits distributed along the Silver Bow Creek stream channel.
- Contaminated groundwater expressed as surface water in Metro Storm Drain. This water is now being collected by the MSD subdrain.
- Surficial tailings along Metro Storm Drain channel (through which surface water flowed prior to 2004).
- Contaminated groundwater in the Missoula Gulch drainage expressed as surface flow just north of Lower Area One. This base flow has been routed into the hydraulic control channel at Lower Area One for combined treatment with captured LAO groundwater.

The major contribution of metals to Silver Bow Creek during periods of storm water flow is run-off from the Butte Hill, which transports metals laden sediments from the waste sources to the Metro Storm Drain and Silver Bow Creek. Additionally, metal laden evaporative salts dissolve into solution and eventually discharge to Silver Bow Creek.

### **5.4.1 Base Flow Conditions**

Two surface water sampling locations are key to the discussion of base flow water quality. One is a sampling station located on Blacktail Creek upstream of the Metro Storm Drain. The other is a station located on Silver Bow Creek at the western border of the OU (Figure 5-8), downstream of Lower Area One.

Both dissolved phase and total recoverable metals analyses were performed. Dissolved phase data are usually used for ecological risk assessment, but surface water quality standards for metals (except aluminum) are based on total recoverable data. For cadmium, copper, lead and zinc, comparisons are made between data collected at the two stations and the chronic aquatic life standard. Arsenic data are compared to the surface water human health standard (DEQ 2006).

The pre-1998 base flow water quality in Blacktail Creek was considered relatively good, with only minor exceedances in values reported for total recoverable copper and lead, and also a minor exceedance in dissolved phase copper (Table 5-2). The mean values for all five COCs were below their respective standards. In comparison, water quality in Silver Bow Creek was very poor prior to 1998. The mean values of total recoverable concentrations for all COCs were above their respective standards; at times orders of magnitude above the standards for cadmium, copper, lead, and zinc.

Because of the poor water quality in Silver Bow Creek, mitigation efforts were undertaken in the mid-1990s. In 1997, 1.2 million cubic yards of tailings and



**Table 5-2**  
**Surface Water Summary Statistics for Base Flow (Prior to 1998)**  
**Record of Decision**  
Butte Priority Soils Operable Unit  
Silver Bow Creek/Butte Area NPL Site

COC <sup>3</sup>		Station			
		Blacktail Creek (12323230) <sup>1</sup>		Silver Bow Creek (SS-07) <sup>2</sup>	
		Dissolved	Total <sup>4</sup>	Dissolved	Total
Arsenic	Count	36	36	52	59
	Min	1.0	2.0	4.0	1.4
	Max	13.0	18.0	18.0	151.0
	Mean	4.7	6.6	7.8	18.6
Standard <sup>5</sup>		18	18	18	18
Cadmium	Count	36	36	52	59
	Min	0.10 <sup>7</sup>	1.00 <sup>7</sup>	0.5	0.6
	Max	0.50	1.00 <sup>7</sup>	8.0	31.0
	Mean	0.11	1.00 <sup>7</sup>	2.8	4.0
Standard <sup>6</sup>		0.28	0.28	0.4	0.4
Copper	Count	36	36	66	59
	Min	1.0 <sup>7</sup>	2.0	19.0	85.0
	Max	10.0	18.0	300.0	2880
	Mean	4.1	7.1	98.2	284.1
Standard <sup>6</sup>		9.6	9.6	12.7	12.7
Lead	Count	36	36	52	59
	Min	0.5	1.0	0.5	1.3
	Max	0.6	9.0	110.0	1360
	Mean	0.5	1.9	13.3	65.6
Standard <sup>6</sup>		3.3	3.3	5.0	5.0
Zinc	Count	36	36	66	59
	Min	3.0	10.0 <sup>7</sup>	320.0	350.0
	Max	10.0	30.0	2520	4910
	Mean	4.7	12.2	977.2	1083.3
Standard <sup>6</sup>		122.6	122.6	162.1	162.1
<b>Parameter</b>					
Flow (cfs)	Count	36		59	
	Mean	15.3		30.6	
Hardness (mg/L as CaCO <sub>3</sub> )	Count	36		59	
	Mean	102.8		142.9	

<sup>1</sup> 12323230 is located on Blacktail Creek upstream of the Butte Priority Soils Operable Unit (near Harrison Ave).

<sup>2</sup> SS-07 is located on Silver Bow Creek at the downstream edge of the BPSOU.

<sup>3</sup> Contaminant of Concern (concentrations reported in µg/L).

<sup>4</sup> State of Montana DEQ-7 standards only apply to total recoverable metals.

<sup>5</sup> 2004 State of Montana DEQ-7 human health standard for surface water.

<sup>6</sup> 2004 State of Montana DEQ-7 chronic aquatic life standard based on hardness.

<sup>7</sup> Value reported at the detection limit.



contaminated soils were removed from LAO and that portion of Silver Bow Creek was reconstructed. An interception trench and a system of treatment lagoons were constructed at LAO to capture and treat contaminated ground water (which formerly discharged directly to Silver Bow Creek).

Through completion of the Lower Area One ERA and through groundwater treatment, base flow water quality in Silver Bow Creek has improved significantly (Table 5-3). The mean and maximum values for the COCs (dissolved phase and total recoverable) are considerably lower than those seen previously. This improvement in water quality is shown visually in Figure 5-20 with a graph of total recoverable copper concentrations over time as measured at Station SS-07 downstream of Butte. Elevated concentrations in recent years coincide with the disturbance during installation of the MSD subdrain and reconstruction of the MSD channel.

With treatment of all groundwater captured in the vicinity of LAO, the remaining major sources of contaminants to Silver Bow Creek are the Metro Storm Drain and stream sediments along Silver Bow Creek upstream of the reconstructed channel. With collection and treatment of water from the Metro Storm Drain and removal of these sediments, as required by the ROD, ARARs for surface water during base flow conditions are achievable.

#### **5.4.2 Wet Weather Conditions**

Storm water runoff from the Butte Hill has been identified as a major contributor of both dissolved phase COCs and metals-laden sediments to Silver Bow Creek. Figure 5-21 and Figure 5-22 depict total recoverable copper and zinc concentrations from 1985 to the present during wet weather conditions. The vertical lines represent the maximum concentration of the COC measured on a particular high flow event. Also depicted are relevant high and low water quality standards.

Significant water quality exceedances (at times orders of magnitude above the standard) have been reported for both copper and zinc and are still occurring. As a result of the serious nature of these past exceedances, actions were taken in the mid to late 1990s and in the early part of this decade to reduce the impact of storm water discharge to Silver Bow Creek.

In 1996 the Storm Water TCRA was initiated to minimize the impacts of runoff on Silver Bow Creek for storm magnitudes up to the 24-hour, 25-year event. This was accomplished, in part, by routing storm water runoff from the upper portion of the Butte Hill in Buffalo Gulch, Missoula Gulch, and the Kelley Mine Yard to the Berkeley Pit, effectively removing storm water runoff from this portion of the Butte Hill (up to the design event). Runoff from Missoula Gulch (west-central portion of the Butte Hill) was captured and routed to a series of three sediment catch basins prior to discharge to Silver Bow Creek.

Other actions taken to improve water quality in Silver Bow Creek during storm water runoff events include capping of approximately 175 mine waste source areas on the Butte Hill during the late 1980s and 1990s. Although the source areas were capped for



**Table 5-3**  
**Surface Water Summary Statistics for Base Flow (1998 to 2002)**  
 Record of Decision  
 Butte Priority Soils Operable Unit  
 Silver Bow Creek/Butte Area NPL Site

COC <sup>3</sup>		Station			
		Blacktail Creek (12323230) <sup>1</sup>		Silver Bow Creek (SS-07) <sup>2</sup>	
		Dissolved	Total <sup>4</sup>	Dissolved	Total
Arsenic	Count	35	35	48	48
	Min	1.1	2.0	4.0	3.6
	Max	6.0	7.0	12.0	19.0
	Mean	2.8	3.7	6.9	9.7
Standard <sup>5</sup>		18	18	18	18
Cadmium	Count	35	35	48	48
	Min	0.02 <sup>7</sup>	0.02 <sup>7</sup>	0.06	0.1
	Max	1.0 <sup>8</sup>	1.0 <sup>8</sup>	4.3	5.0
	Mean	0.2	0.4	1.0	1.3
Standard <sup>6</sup>		0.3	0.3	0.4	0.4
Copper	Count	35	35	48	48
	Min	0.8	1.5	2.5	13.5
	Max	9.3	10.0	77.0	110.0
	Mean	2.8	4.6	18.2	46.8
Standard <sup>6</sup>		10.1	10.1	13.9	13.9
Lead	Count	33	34	46	48
	Min	0.05 <sup>8</sup>	1.0 <sup>8</sup>	0.1	1.0
	Max	1.0 <sup>8</sup>	5.0	2.4	36.0
	Mean	0.7	1.2	0.9	7.1
Standard <sup>6</sup>		3.6	3.6	5.8	5.8
Zinc	Count	35	35	48	48
	Min	1.0	2.0	60.0	86.0
	Max	20.0	40.0	1050	1080
	Mean	6.7	10.6	309.2	362.6
Standard <sup>6</sup>		130.0	130.0	177.8	177.8
<b>Parameter</b>					
Flow (cfs)	Count	35		57	
	Mean	8.9		25.5	
Hardness (mg/L as CaCO <sub>3</sub> )	Count	35		48	
	Mean	110.1		159.4	

<sup>1</sup> 12323230 is located on Blacktail Creek upstream of the Butte Priority Soils Operable Unit (near Harrison Ave).

<sup>2</sup> SS-07 is located on Silver Bow Creek at the downstream edge of the BPSOU.

<sup>3</sup> Contaminant of Concern (concentrations reported in µg/L).

<sup>4</sup> State of Montana DEQ-7 standards only apply to total recoverable metals.

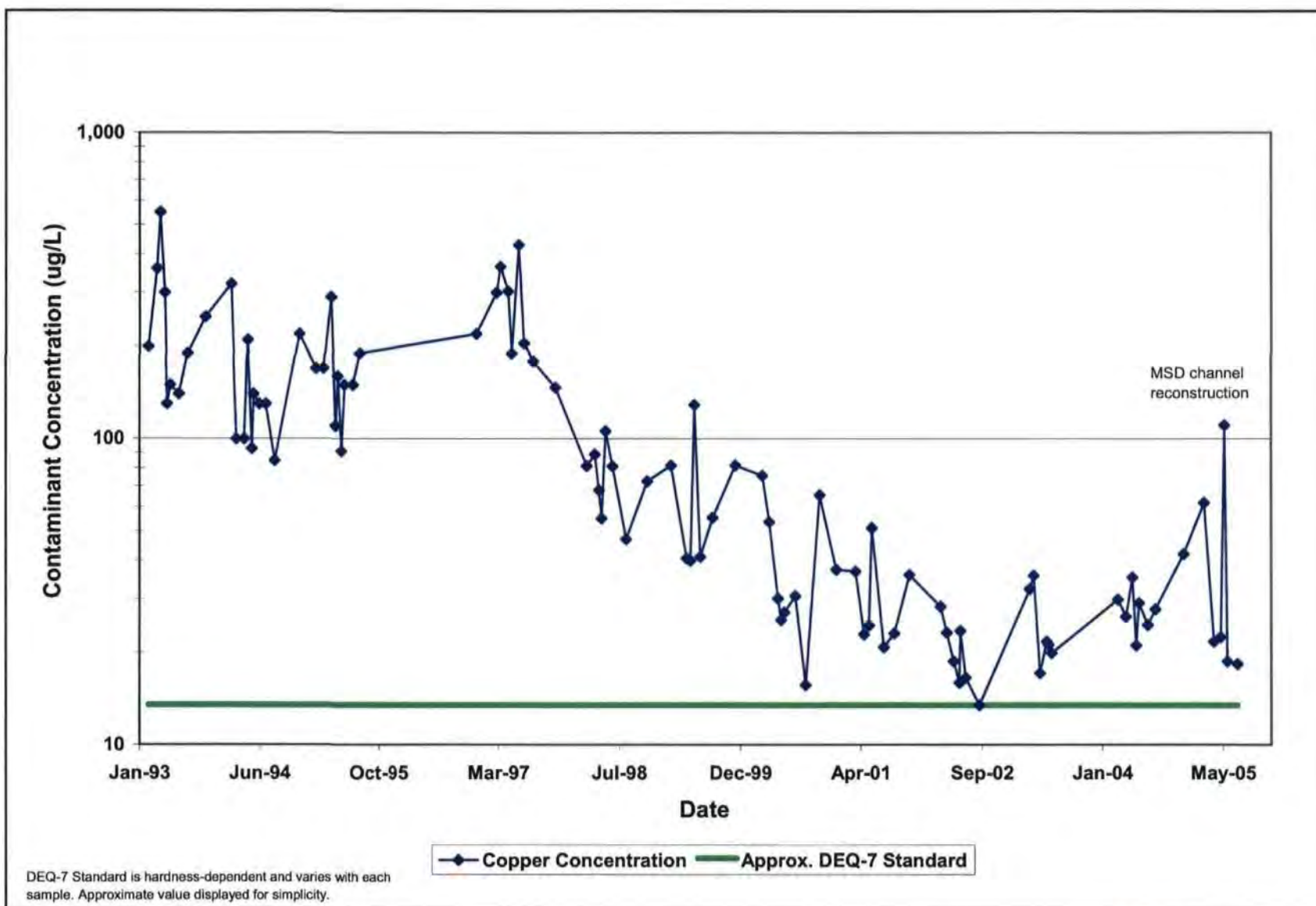
<sup>5</sup> 2004 State of Montana DEQ-7 human health standard for surface water.

<sup>6</sup> 2004 State of Montana DEQ-7 chronic aquatic life standard based on hardness.

<sup>7</sup> Estimated value.

<sup>8</sup> Value reported at the detection limit.

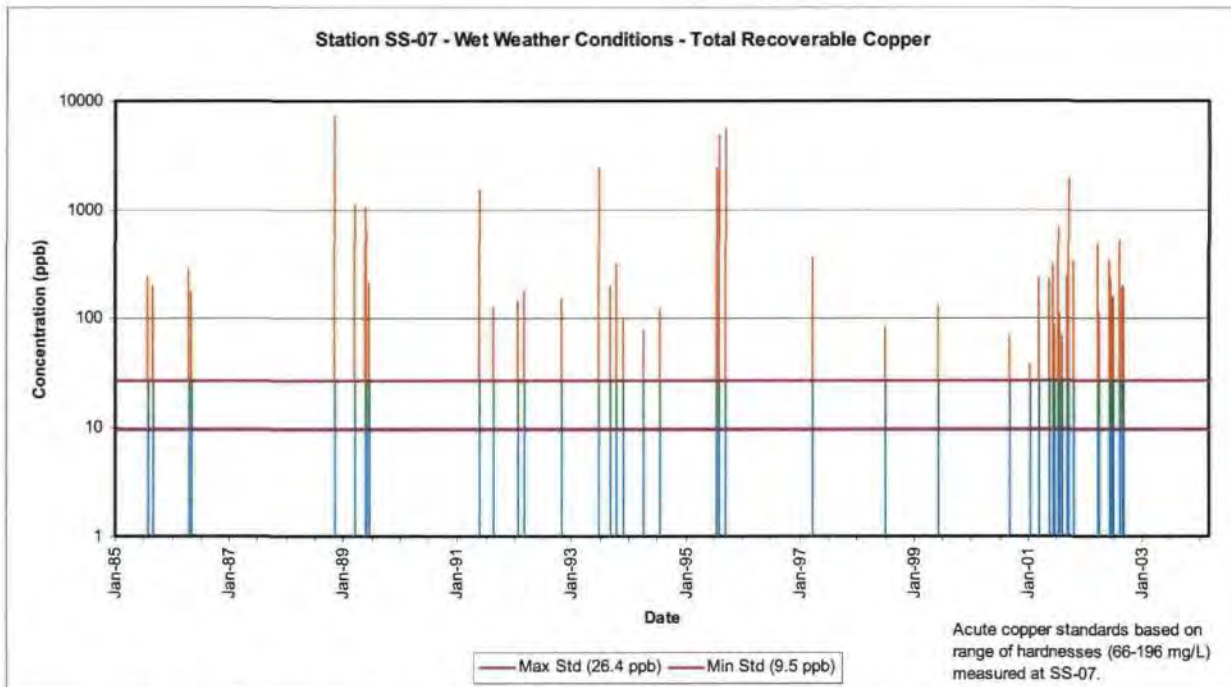




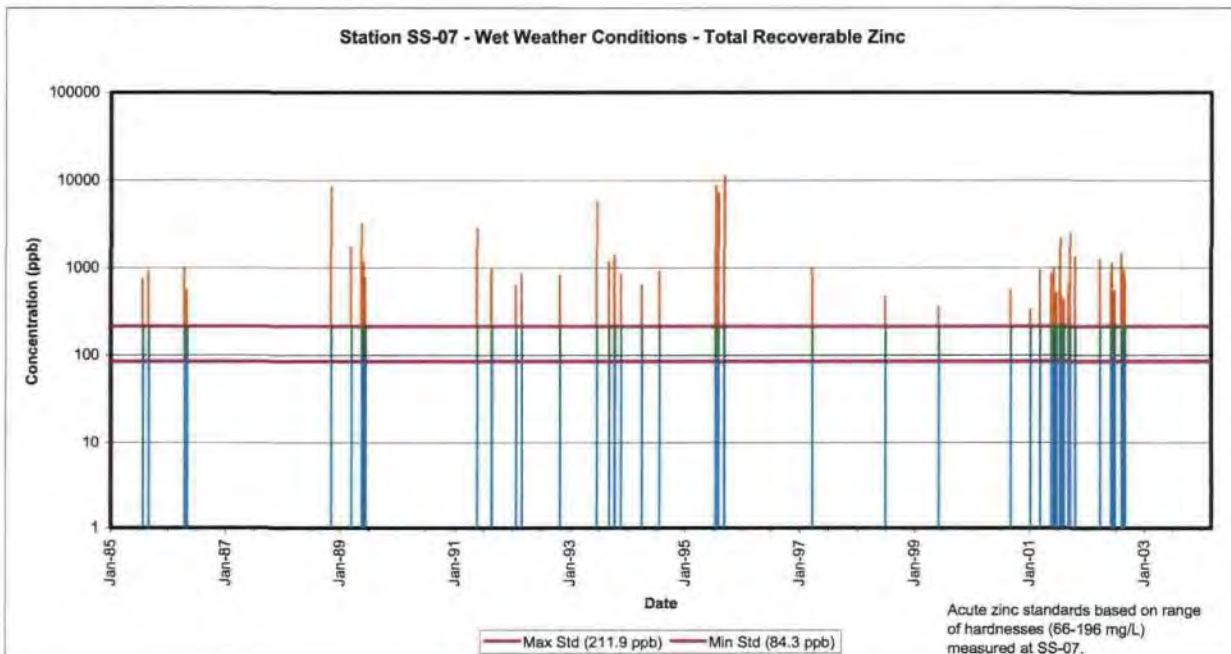
**Figure 5-20**  
**Total Recoverable Copper Concentration in Silver Bow Creek**  
**Directly Below Butte (Station SS-07)**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**







**Figure 5-21 Copper Concentrations for Wet Weather Flow Conditions at Station SS-07**



**Figure 5-22 Zinc Concentrations for Wet Weather Flow Conditions at Station SS-07**

**Record of Decision  
Butte Priority Soils Operable Unit  
Silver Bow Creek/Butte Area NPL Site**





human health issues related to lead and arsenic, the source areas also acted as significant contributors of metals-laden sediments to Silver Bow Creek during storm events. In addition to protecting human health, the vegetative caps on the source areas also prevent contact of waste materials with storm water, minimizing contaminant transport.

The previously discussed Railroad Beds TCRA was initiated to meet the human health goals by either removing or capping in-place contaminated railroad bed materials. The caps also aided in meeting the goal of controlling storm water runoff by providing a protective barrier that reduced sediment transport. To further meet the goal of controlling storm water runoff, numerous ditches, culverts and sediment basins were constructed. This included the diversion of a significant portion of run-off from the east side of the Butte Hill to the Berkeley Pit (in addition to that captured by the Kelley Mine Yard diversion described above).

As a result of the Storm Water and Railroad Beds TCRAs, a large portion of the storm water runoff from the Butte Hill is either diverted to the Berkeley Pit (thereby removing the potential to discharge to Silver Bow Creek) or is detained in catch basins for sediment reduction prior to discharge to Silver Bow Creek.

In 2003, as part of the construction of the Metro Storm Drain subdrain, ARCO removed about 45,000 cubic yards of contaminated sediment material from the Metro Storm Drain channel. The channel was then reconstructed to convey storm water flow. The subdrain generally prevents contaminated groundwater from discharging to the surface channel (improvements to this system are being considered currently and may be further considered during remedial design) and the reconstructed channel prevents storm water from contacting tailings and other waste material as it runs along Metro Storm Drain. The Metro Storm Drain reconstruction was completed in late 2004 and another marked improvement in Silver Bow Creek water quality is expected.

### **5.4.3 Surface Water Summary**

As previously discussed in Section 5.4.1 and shown in Table 5-3 and Figure 5-20, actions taken to date have improved base flow water quality in Silver Bow Creek, although exceedances of standards continue to occur. However, significant exceedances of water quality standards still occur under wet weather flow. The in-stream contaminant concentrations for wet weather flow have not been reduced to the same magnitude as those for base flow. However, the total volume of contaminants reaching Silver Bow Creek from wet weather has been reduced by diverting much of the run-off to the Berkeley Pit and by removing metals laden sediments in catch basins.

## **5.5 Air Characterization**

Air quality data collected since the late 1980s indicate that late fall, winter, and early spring are generally associated with the highest particulate levels in the Butte area. These typically occur during periods of temperature inversions. However, these high



particulate levels are primarily associated with smoke from wood burning, road dust, and vehicle exhaust and, to a lesser extent, dust emissions from active mining and milling operations. While air quality in Butte was poor due to the open heap roasting of ore and smelting operations during the earliest days of mining operations until well into the twentieth century, this is no longer the case.

The human health risk assessments concluded that the risks from inhalation of COCs were at least 10 times less than the risks associated with ingestion of COCs in soils and dust. Calculated inhalation risk was near the point of departure, and EPA concluded that inhalation of COCs does not present a significant human health risk.

Unreclaimed source areas were not a significant source of 10-micron particulate matter (PM-10) emissions, even prior to any of the reclamation actions in the OU. The PM-10 data from the various stations around Butte show that particulate concentrations in Butte are quite low, with no exceedances of the annual 50 microgram per cubic meter ( $\mu\text{g}/\text{m}^3$ ) standard since 1987. Only one exceedance of the daily 150  $\mu\text{g}/\text{m}^3$  standard has been noted since 1989. Additionally, particulate levels have been decreasing over the past 10 to 15 years (Figure 5-23).

In 2001, EPA evaluated the existing data and concluded that airborne transport of COC-bearing particulates does not pose a significant threat to human health and that COC transport due to wind erosion of particulate matter is low and decreasing. This study found that the impact of COCs from source areas through the air pathway is expected to be minimal for the following reasons:

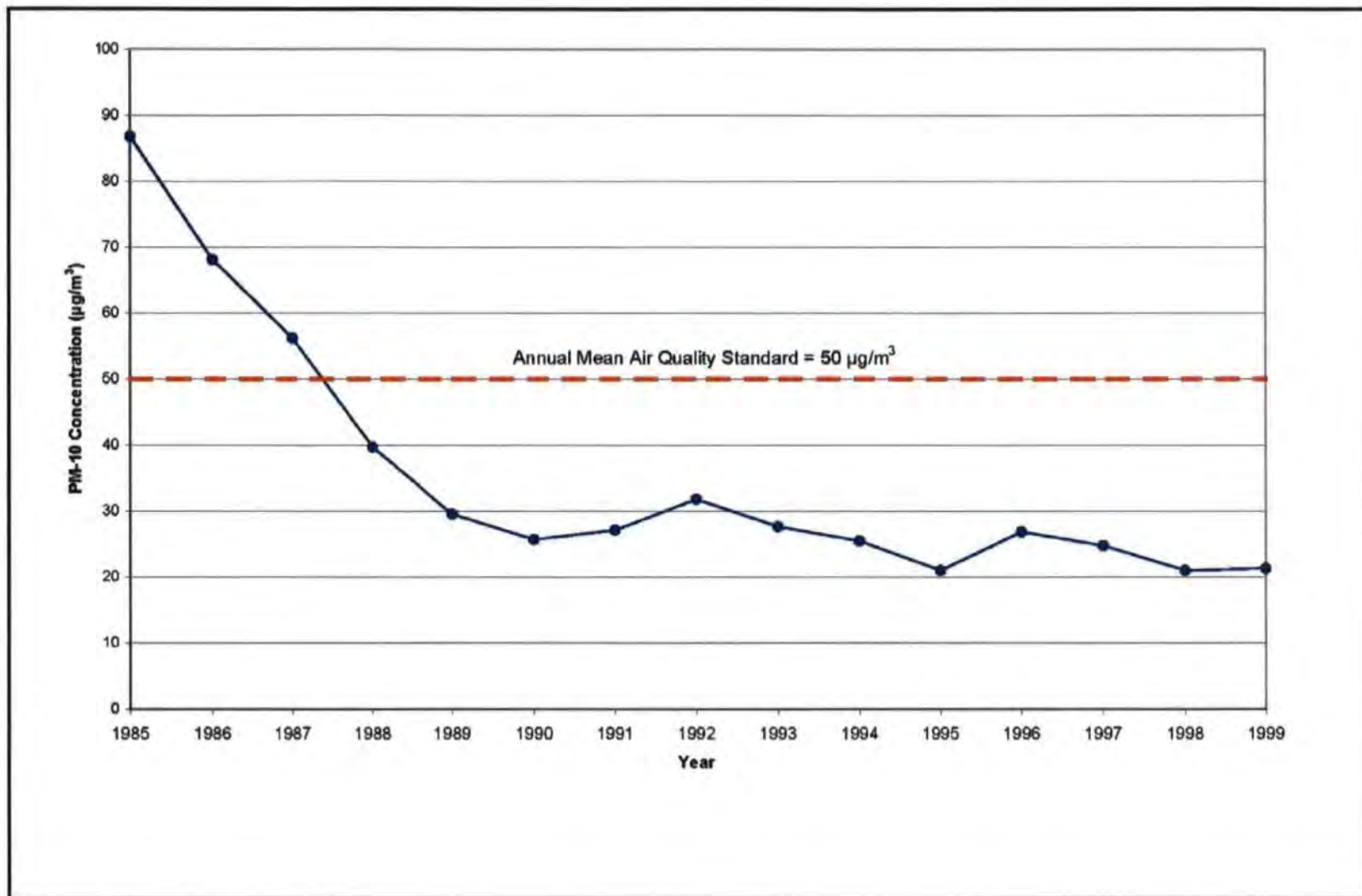
- Inhalation of COCs was determined to not be a human health risk
- PM-10 concentrations have decreased significantly over the last 15 years, and COC concentrations, comprising a fraction of PM-10, would show a concomitant decrease
- Fugitive dust emissions from mine waste source areas are being addressed through reclamation and revegetation

## 5.6 Site Conceptual Model

The primary sources of contaminants in the OU are mining and ore processing wastes, which include waste rock dumps, milling wastes (i.e., tailings), and smelting wastes. The primary release mechanisms for mine wastes, tailings, and waste on railroad beds are wind erosion, infiltration, percolation, and runoff. These pathways were individually evaluated. Those that were complete and presented a significant risk to human health or ecological receptors were evaluated quantitatively in the risk assessments.

Transport of contaminants can also occur from secondary sources. These include surface soils to surface water by runoff, acid, arsenic and heavy metals to groundwater through infiltration and percolation, and contaminated dust to other media through wind erosion.





**Figure 5-23**  
**Average PM-10 Concentrations**  
**Greeley School Location (30-093-0005)**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**



*Section 5*  
*Summary of Site Characteristics*

### **5.6.1 Human Receptors**

Figure 5-24 presents the Site Conceptual Model for human receptors. It is important to note that many of the site risks have been largely eliminated at the site through EPA Response Actions. The significant (+) and minimal (-) human health exposure pathways are:

Residents (Adults and Children Ages 0 - 6):

- +Ingestion of surface soils
- +Ingestion of interior dust
- -Inhalation of fugitive dust
- +Ingestion of contaminated groundwater (requires concerted effort to establish pathway)
- +Ingestion of attic dust (requires concerted effort to establish pathway)

Commercial Workers (Adults):

- +Ingestion of surface soils
- +Ingestion of interior dust
- -Inhalation of fugitive dust

Railroad Workers (Adults):

- +Ingestion of surface soils
- -Inhalation of dust

Recreational Visitors (Inner tubers):

- +Ingestion of surface water
- +Dermal exposure to surface water
- -Inhalation of fugitive dust

### **5.6.2 Ecological Receptors**

Terrestrial habitat is limited due to the urban nature of the OU. Therefore, EPA focused the assessment of ecological risk on the aquatic habitat of Silver Bow Creek and surface water ponds that might represent habitat for waterfowl. The site conceptual model for ecological risks is shown in Figure 5-25. EPA identified two complete pathways by which fish and benthic macroinvertebrates may be exposed to toxic levels of arsenic and metal contaminants:



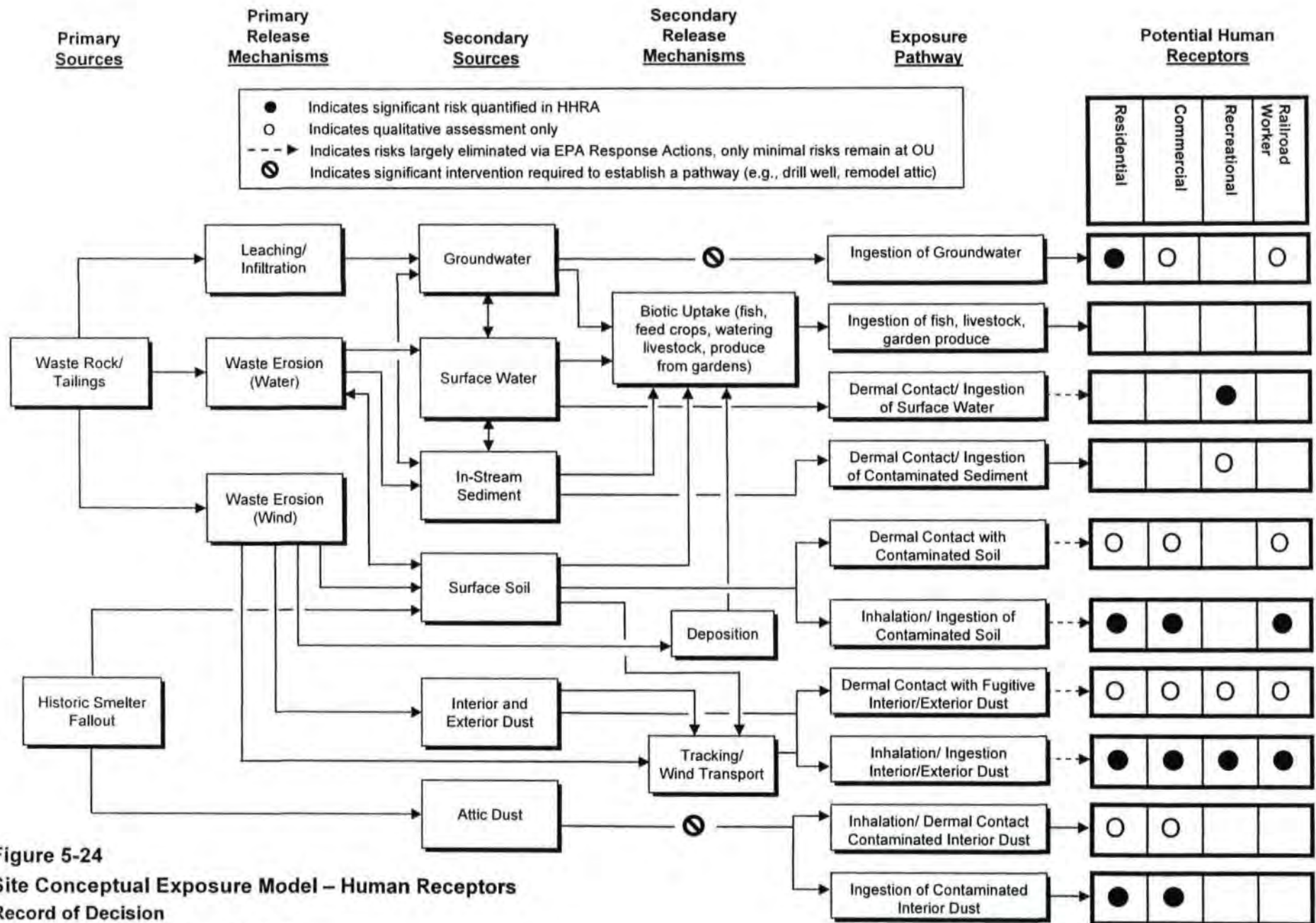
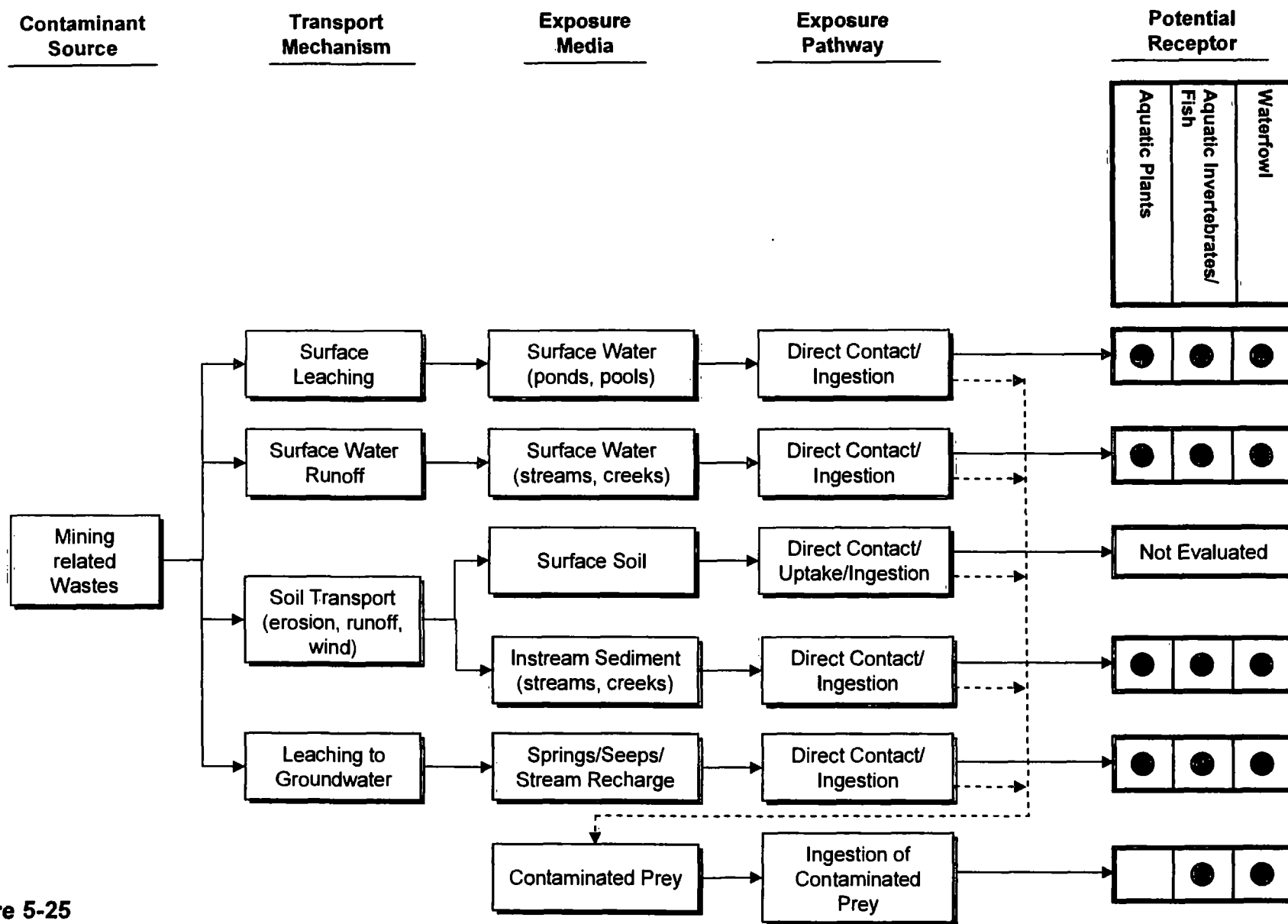


Figure 5-24  
 Site Conceptual Exposure Model – Human Receptors  
 Record of Decision  
 Butte Priority Soils Operable Unit  
 Silver Bow Creek/Butte Area Site





**Figure 5-25**  
**Site Conceptual Exposure Model – Ecological Receptors**  
 Record of Decision  
 Butte Priority Soils Operable Unit  
 Silver Bow Creek/Butte Area Site



- Respiratory exposure to, and direct contact with, surface water and sediment by aquatic organisms
- Ingestion of prey and incidental ingestion of sediments

Waterfowl may be exposed to toxic levels of site contaminants in surface water and sediment via:

- Direct ingestion of surface water and sediments
- Ingestion of contaminated prey

Silver Bow Creek was once home to thriving trout populations, including bull trout. Bull trout is a listed threatened species under the Endangered Species Act. The State and the U.S. Fish and Wildlife Service maintain a strong interest in adequate protection of aquatic receptors, which are at risk under current conditions.

## 5.7 Historic and Cultural Resources

In 1962, the Butte mining district was designated as a National Historic Landmark District. The boundary of the Butte Historic District is defined by the city limits of Butte.

In 1992, EPA, DEQ, ARCO, the State Historic Preservation Office, the Advisory Council on Historic Preservation, and the local governments of Butte-Silver Bow County and Walkerville signed a Programmatic Agreement. The agreement calls for a programmatic approach to addressing historical resources affected by Superfund work. The parties worked together on development of the Regional Historic Preservation Plan (RHPP), which was completed in 1993.

A second Programmatic Agreement was subsequently prepared to establish required procedures and mitigation activities. The agreement has been effective in predicting the impacts to historic and cultural resources during Superfund activities, providing for the avoidance or, when necessary, mitigation of impacted resources. The requirements for this agreement will continue during implementation of this ROD since the National Historic Preservation Act is an ARAR.

The Visitor Center was constructed and developed by the PRP Group to partially mitigate the loss of historic resources. The Visitor Center was a joint cooperative effort by local and state government agencies, corporations, non-profit organizations, and private citizens. The center is home to and managed by the Butte-Silver Bow Chamber of Commerce.

Other historic and cultural resources include the Granite Mountain Memorial, the slag walls and aqueduct at the Butte Reduction Works, the Berkeley Pit, the Anselmo and other mine yards, and photographic documentation produced under the Walkerville TCRA.



Section 5  
*Summary of Site Characteristics*

As described in this ROD, additional historic mitigation at Lower Area One will be implemented as a component of the final remedial action. Avoiding the destruction of the historic resources has preserved many of the areas, and the historical community and agencies strongly encourage preservation and avoidance where possible and where consistent with the components of this ROD. The portion of the BPSOU remedy that addresses the Granite Mountain Memorial area was designed to preserve mining features by avoidance, and it was a request from the local city/county government and historical stakeholders. Interpretive signage is planned or in place for the walking trails constructed on the former Butte, Anaconda & Pacific/Tourist railroad line, on the Alice Dump, in Buffalo and Missoula Gulches, and at other historic locations.

The Butte and local area was part of the aboriginal lands of the Salish and Kootenai Indian Tribes. The Confederated Salish and Kootenai Tribes (the Tribes) maintain use rights of this area under a treaty with the United States. EPA has worked cooperatively with the Tribes to identify and avoid tribal religious or historical and cultural resources. This effort will continue during the design and remedial action phases. The Tribes have expressed a strong interest in the cleanup of Silver Bow Creek and Blacktail Creek, which were historic fishing areas for the Tribes. The bull trout and its habitat are especially important to the Tribes.



## **Section 6 Current and Potential Future Land and Resource Uses**

### **6.1 Land Use**

The boundary of the BPSOU encompasses a large area of both Walkerville and Butte. The OU is primarily an urban setting, which is characterized by older homes and historic mining features. The area covered by the OU has a range of land uses that are typical of urban areas: residential, industrial, commercial, and recreational (Figure 6-1). It includes a number of private and public schools, parks, and playing fields. Several rail lines also run through the OU. There is no agricultural land within the OU.

The majority of Butte's housing stock was built before 1959. Houses are typically built close together on lots that are 100 feet by 40 feet, or less. The Butte-Silver Bow County Planning Board enforces the land use regulations in the area, including several that are specific to the needs of a Superfund site.

Land outside of the OU becomes increasingly less residential with distance. Nearby notable land uses include the Berkeley Pit and the active mining operations at Montana Resources' Continental Pit and Yankee Doodle Tailings Pond. Beyond Butte and Walkerville, land use is primarily agricultural and recreational (U.S. Forest Service and Bureau of Land Management).

### **6.2 Economy of Butte**

Over its colorful history, the economy of Butte has been based primarily on mining. During the economic boom periods, the population of Butte approached 100,000. Butte's current population is approximately 34,000. In the 1980s, economic conditions deteriorated significantly after ARCO ceased mining at the Berkeley Pit, which idled roughly one third of Butte's work force.

More recently, some of Butte's major employers – Touch America and NorthWestern Energy, formerly known as Montana Power Co. – have struggled, significantly affecting the Butte economy. The business misfortunes of these companies has affected the economy directly, through the loss of jobs, and indirectly through the loss of income generated via the purchase of goods and services, payment of taxes, payment of pensions, and loss of stock equity value. The economic hardship that Butte has suffered has raised the issue of whether the low-income population within the OU is affected by environmental justice issues.

Today, Butte celebrates its mining history and promotes economic growth by developing tourism, high technology research and manufacturing, engineering, health care, education, and cultural arts. The current economy, while not as vigorous as during the booming mining years, is improving



Section 6  
Current and Potential Future Land and Resource Uses



**Figure 6-1**  
**Relationship of the BPSOU to the Butte/Walkerville**  
**Urban Setting**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**





and is broader based including tourism, technical services, government, mining, retailers, recreation, etc.

Butte's historic features contribute to its economic stabilization. Butte has one of the largest National Historic Landmark Districts in the country, with over 4,500 buildings listed as national historic sites or buildings. Groups, such as Main Street Uptown Butte and Imagine Butte, are working to find the funding necessary to encourage and allow maintenance and development of these structures.

### 6.3 Redevelopment in the Cleanup Process

EPA encourages redevelopment of Superfund sites wherever possible. At large mining sites, it is not always feasible to remove all contaminated waste, and the remedy described in this ROD uses a mix of waste removal and in-place capping of waste. Many areas of mine waste have been capped in place.

Past response actions are monitored and maintained to assure that the remedy is effective and permanent. It is also the objective of EPA to assure that the remedy does not restrict future redevelopment. This approach is consistent with EPA's current redevelopment guidance and initiative. A number of site work plans since 1990 have included redevelopment. The following illustrates how Superfund cleanup has been done in Butte over the past 18 years in a manner that has improved public health and the environment while allowing for many significant redevelopment projects.

EPA's redevelopment role is to work with residents on ideas, coordinate redevelopment with cleanup wherever possible, evaluate land use, address historic preservation issues, and comply with the Regional Historic Preservation Plan.

Current and future redevelopment work at the Silver Bow Creek/Butte Area Site includes:

- **Montana's Copperway.** A system of historic sites in Butte and Walkerville linked by recreational trails, including interpretive signs and stations.
- **Butte Hill Trail.** A walking trail developed from an abandoned railroad bed.
- **Copper Mountain Recreation Complex.** A new recreational complex (baseball fields, soccer fields, etc.) was built on top of the repository for the Clark Tailings and Colorado Tailings.
- **Granite Mountain Memorial.** A monument to the miners who died in the Granite Mountain/Speculator fire of 1917 was constructed. The area will be enhanced with picnic tables, walking trails, a new access road and the historic mining landscape will be preserved.
- **Knob Hill.** The Alice dump and pit in Walkerville were reclaimed and walking trails and picnic tables added.



EPA has also been involved in a variety of projects related to land use at the site, whether alone or in partnership with other state or local agencies. These include:

- **Education.** Maintenance of protective vegetative caps is important to the success of the Butte environmental cleanup. Unfortunately, each year some caps are damaged by motorized vehicle traffic. EPA provides funding to the Citizen's Environmental Technical Committee (CTEC) through a technical assistance grant. CTEC, local government officials, concerned citizens, representatives of law enforcement, and motor vehicle use group members make up the Butte Area Communication Advisory Committee. This group works to develop an educational program to deter people from activities that damage the caps.
- **EPA Grants.** Since 2001, EPA awarded grants specifically for efforts related to future development of the site. This has included a \$100,000 grant awarded to Butte-Silver Bow County for geophysical work to determine structural integrity of vacant properties in Uptown Butte and Central Butte and a \$30,000 grant to develop a film on the history of the Butte area and the role Superfund has played in its redevelopment.
- **Property Transfer.** Public and private cooperation is making it possible to transfer properties owned by the ARCO and mining companies to local government for potential redevelopment.
- **Open Space.** Open space is needed in management of storm water, and is also desirable for aesthetic reasons. Storm water is a primary concern in the Butte cleanup. It must be routed to appropriate locations to avoid damage to caps and to reduce COC loading to Silver Bow Creek. The Butte Hill Trail is an example of how cleanup can produce community benefits.
- **Walkerville Baseball Field.** EPA collaborated with the PRPs and local governments in the creation of a new baseball field for Walkerville in 1988.
- **Geographic Information System (GIS).** In the early 1990s, ARCO purchased a GIS system to be used for Superfund activities. The system also now allows for a variety of other tasks such as urban planning and redevelopment.
- **State Assistance.** Butte-Silver Bow has received Resource Indemnity Trust grant funds from the State of Montana to address other important issues on the Butte Hill, including underground subsidence and the restoration of historic head frames.
- **Source Area Redevelopment.** In some areas, a large volume of contaminated material served as the source for migration of contaminants via wind, water, or other types of transport. To date, more than 420 acres of source areas have been addressed to stop or slow this migration and make these areas safe. EPA worked with ARCO, other PRPs, and landowners to combine removal, capping, and redevelopment in ways that met both public and private community redevelopment needs.



■ **Mine Yard Redevelopment.** Along with the previously mentioned source areas, there are several mine yards - areas where mining shafts were/are located - that are being redeveloped. Work at these areas has included:

- Redevelopment of the Anselmo Mine Yard for public tours and other activities.
- Redevelopment of the Kelley Mine Yard into offices for ARCO.
- Cleanup of the Steward Mine Yard for future redevelopment by Butte-Silver Bow County.
- Redevelopment of the Syndicate Pit (now used by Montana Tech as a training ground for students of underground mining).

Examples of these public and private redevelopment projects are shown in Figure 6-2.

## 6.4 Surface Water Use

Silver Bow Creek, Blacktail Creek, and Grove Gulch Creek comprise the surface water bodies in the BPSOU. Beginning at the confluence of Blacktail Creek and Metro Storm Drain, Silver Bow Creek, flows from east to west through the BPSOU. Grove Gulch Creek is small tributary that joins Blacktail Creek above its confluence with Silver Bow Creek.

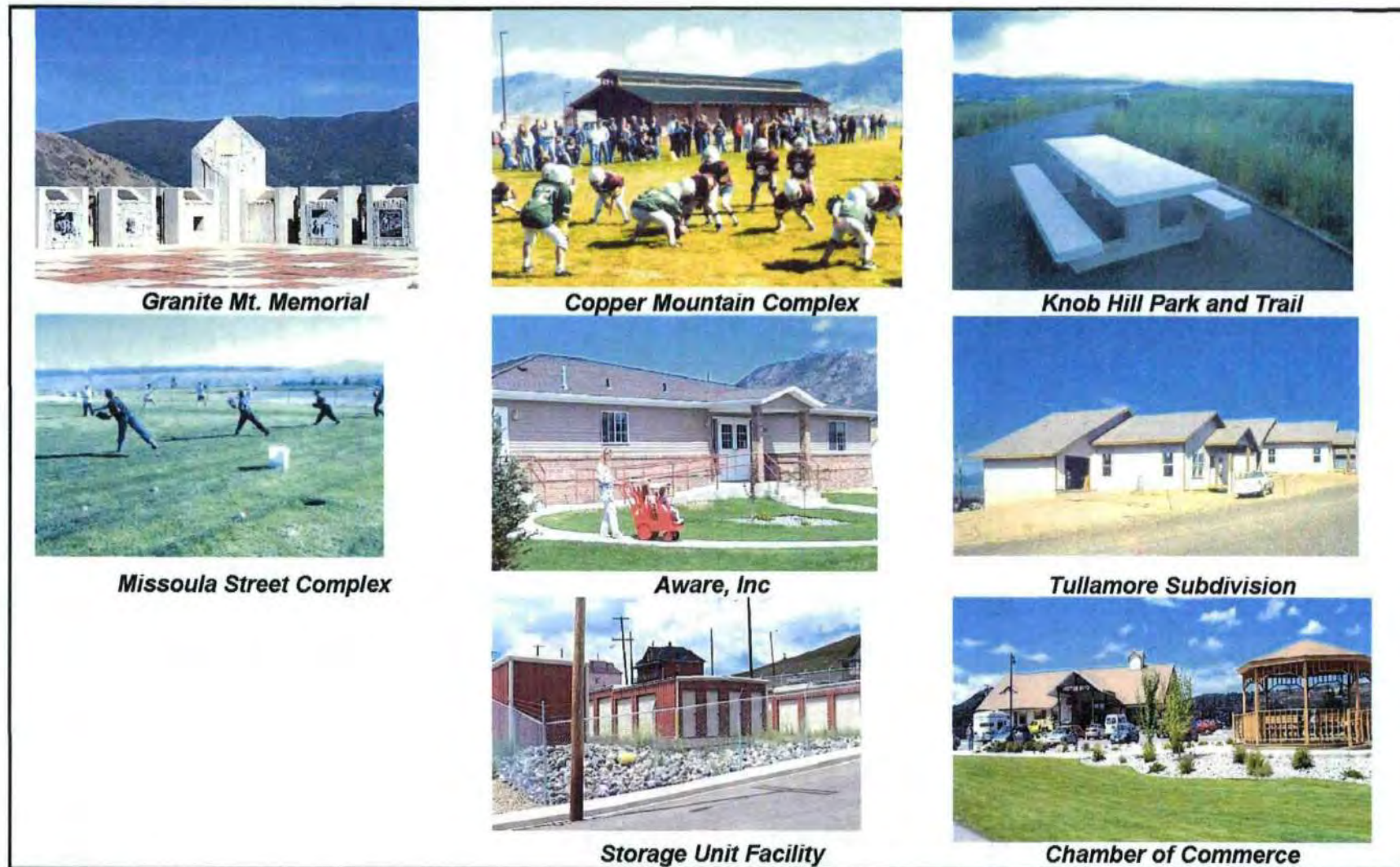
Blacktail Creek and Grove Gulch Creek are classified “B-1” for their water use. B-1 waters are suitable for drinking, culinary, and food processing purposes after conventional treatment. These waters are also suitable for bathing, swimming, recreation, the growth and propagation of salmonid fishes and associated aquatic life, waterfowl, furbearers, and as a water supply for agricultural and industrial use.

Silver Bow Creek from the confluence of Blacktail Creek to Warm Springs Creek (southeast of Anaconda) is classified “I” for water use. I-class streams are impaired and the State of Montana has a goal to improve these waters to fully support beneficial uses. These beneficial uses are considered supported when the concentration of toxic, carcinogenic, or harmful parameters in these waters do not exceed the applicable standards specified in the DEQ-7 Circular. Silver Bow Creek as it flows through the BPSOU is not used as a drinking water source or for agricultural or industrial use. There are reports of limited recreational use (inner tubing and swimming) on Silver Bow Creek.

One of the major remedial goals at the BPSOU is to restore Silver Bow Creek to its beneficial uses – particularly returning it to a stream that can support a fishery and other aquatic life and meets ARARs. The Selected Remedy is anticipated to meet or exceed that goal.



Section 6  
Current and Potential Future Land and Resource Uses



**Figure 6-2**  
**Examples of Public and Private Redevelopment at the**  
**Silver Bow Creek/Butte Area Site**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**





## 6.5 Groundwater Use

BPSOU site groundwater is not currently a source of drinking water, except for a few cases where groundwater is not contaminated. The City of Butte obtains drinking water from sources outside of the immediate area. Current drinking water sources for residents within the BPSOU are Moulton Reservoir, Basin Creek Reservoir, the Big Hole River, and two bottled water companies. These water sources are located outside of the BPSOU and are not impacted by site contamination.

There are groundwater wells located in the BPSOU, but they are not used as a drinking water source. Very low flow rates in the alluvial aquifer, along with the area's general industrial land use and extensive contamination, make domestic use of the aquifer questionable. With the exception of the Clark Tailings Area, which is under an approved Groundwater Control Area designation (a state-approved groundwater use ban), the drilling and use of groundwater is not currently prohibited. Preliminary work on more extensive state-approved bans has been ongoing. Local ordinance requires residents to be connected to the municipal domestic water supply system if they are within 300 feet of the supply system. Properties connected to the water system are prohibited from using groundwater for any purpose other than sprinkling or irrigation. Butte-Silver Bow County has an ordinance that states it "...is required at the owner's expense to install suitable water service facilities therein, and to connect such facilities directly to the water main within sixty days after date of official notice to do so, provided that a water main is located within a distance of three hundred feet from the owner's property line". The ordinance goes on to state that "... the occupants of property connected to the water system may not use water provided by wells for any purpose other than sprinkling or irrigation".

The alluvial aquifer throughout much of the BPSOU has elevated levels of COCs. COC concentrations are variable over several orders of magnitude, with numerous exceedances of DEQ-7 groundwater standards. Although a significant number of response actions have been conducted, including the removal of a large volume of source material in LAO, the removal or capping of source areas, and improved storm water routing and runoff from Butte Hill, substantial improvement of groundwater quality is anticipated to take decades to centuries. Therefore, a controlled groundwater area will be established for the alluvial aquifer as part of this ROD and contaminated groundwater will be captured and treated prior to discharge to Silver Bow Creek. The groundwater that is captured and treated may be used to meet public or industrial needs.



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## Section 7 Summary of Site Risks

Risk assessments have been conducted in Butte since the early 1990s to quantify actual and potential human health and environmental risks from chemical contaminants in tailings, waste rock, soils, indoor dust, surface water and groundwater. The baseline risk assessment estimates what risks the site poses if no action were taken and identifies the contaminants and exposure pathways that need to be addressed by the remedial action.

Previous response actions have greatly reduced site risks. Nevertheless, contamination remaining on-site still presents unacceptable risks to human and ecological receptors. The Selected Remedy is necessary to protect public health or welfare or the environment from actual or threatened releases of these and other contaminants to the environment. The COCs at the BPSOU, by media, are shown in Table 7-1. The key COCs at the site are arsenic, cadmium, copper, lead, mercury, and zinc.

**Table 7-1**  
**Summary of Chemicals of Concern for the BPSOU**  
**Record of Decision**  
*Butte Priority Soils Operable Unit*  
*Silver Bow Creek/Butte Area NPL Site*

<b>Chemical</b>	<b>Solid Media</b>	<b>Groundwater</b>	<b>Surface Water</b>
Aluminum			X
Arsenic	X	X	X
Cadmium		X	X
Copper		X	X
Iron			X
Lead	X	X	X
Mercury	X	X	X
Silver			X
Zinc		X	X

### 7.1 Human Health Risks

The primary sources of BPSOU site contaminants are mining, milling, smelting and ore processing wastes, which include waste rock piles, milling and concentrator wastes, and smelting wastes. The primary routes of movement of these contaminants are runoff, infiltration, percolation, and wind erosion. Contaminant movement can also occur from secondary sources: surface soils to surface water by runoff; transport to groundwater through leaching, infiltration, and percolation; and contaminated dust to other media through wind erosion.

Regarding human health risks, the exposure pathways of concern for contaminants at the BPSOU are ingestion of soils and dust, direct contact with skin, and ingestion of water. Depending upon the characteristics of the contamination and the population, some pathways are more important than others. All primary and secondary transport



pathways were reviewed in accordance with the EPA risk assessment guidance and procedures, and those that were complete and presented a risk to human health were evaluated quantitatively. The Selected Remedy is intended to prevent or mitigate exposure pathways through appropriate excavation and removal (especially in yards and attics), capping, land reclamation, institutional controls, storm water controls, and groundwater control and treatment. Another major purpose of the Selected Remedy is to maintain and monitor the remedy to ensure that exposure pathways are prevented or mitigated.

For humans, the primary exposure pathways at the OU are:

- Ingestion of surface soils (for residents, commercial workers, and railroad workers);
- Ingestion of interior dust (for residents and commercial workers);
- Dermal exposure to surface water (for recreational visitors);
- Ingestion of surface water (for recreational visitors); and
- Ingestion of alluvial groundwater risks were calculated, although no current exposures occur.

Only one significant secondary exposure pathway for humans was identified: inhalation of fugitive dust (for residents, commercial workers, railroad workers, and recreational visitors).

The Preliminary Baseline Risk Assessment ([PBRA], Clement 1991) used data collected from the Butte Soil Screening Study (CDM 1988) to identify contaminants present in the BPSOU that posed significant human health risks. The PBRA concluded that arsenic and lead could pose a risk to human health at the BPSOU site. The PBRA ruled out further assessment of exposure to cadmium. Mercury was generally not evaluated because many mercury source areas discovered in Walkerville had been addressed, and the study assumed any future discovery of mercury would be similarly addressed. Therefore, EPA conducted subsequent human health risk assessments focused on arsenic and lead exposure scenarios within the BPSOU. These assessments were:

- The Preliminary Baseline Human Health Risk Assessment for Lower Area One (CDM, 1991);
- Baseline Human Health Risk Assessment for Lead (CDM 1994) and Enforcement/ Action Memorandum - Butte Priority Soils Operable Unit (EPA 1994);
- Baseline Human Health Risk Assessment for Arsenic (CDM 1997) and Enforcement/ Action Memorandum - Railroad Bed Time Critical Removal Action Attachment A: Arsenic Action Levels (EPA 1999a);



- Technical Memorandum: Addendum to the Baseline Human Health Risk Assessment; Evaluation of Human Health Risks Associated with Exposure to Alluvial Ground Water - Butte Priority Soils Operable Unit (CDM 2001a); and
- Human Health Risk Assessment, Walkerville Residential Site (UOS 2003).

Major findings of each of these assessments are discussed below.

### **7.1.1 Preliminary Baseline Human Health Risk Assessment for Lower Area One**

The Final Preliminary BRA for LAO was completed in 1991. The risk assessment evaluated human health and ecological risks associated with inorganic contaminants in groundwater and surface water for the LAO portion of the BPSOU. The objective of the human health portion of the LAO risk assessment was to evaluate the potential effects of contaminated surface water and/or groundwater from LAO for human receptors. The final list of COCs based on concentrations, frequency of detection, and toxicity were arsenic, cadmium, chromium, lead, and zinc.

Based on current and future land-use at LAO, several human exposure scenarios for both surface water and groundwater were evaluated during the LAO risk assessment including occupational, recreational (swimming, inner-tubing), trespassing, and residential scenarios. The assessment quantitatively characterized the potential carcinogenic risk and noncarcinogenic health impacts from exposure to COCs in both groundwater and surface water within LAO. Risks to human receptors from exposure to COCs in surface water were determined to be low and negligible in comparison to the risks associated with exposure to COCs from daily ingestion of groundwater. Based on a future residential scenario, where groundwater in the alluvial aquifer beneath LAO would be consumed daily over a lifetime (70 years), unacceptable carcinogenic risk was determined from exposure to arsenic and unacceptable non-carcinogenic risk was determined from exposure to arsenic, cadmium, and zinc. Also, lead in groundwater presented a potential concern because it was determined that daily ingestion of lead concentrations in groundwater at LAO may result in blood lead levels above 10 micrograms per deciliter ( $\mu\text{g}/\text{dL}$ ). Exposure to COCs in surface water and groundwater from non-residential exposure scenarios were determined not to pose a human health risk.

### **7.1.2 Baseline Human Health Risk Assessment for Lead**

The BRA for lead, completed in 1994, was conducted to evaluate potential human health risks associated with exposure to lead within residential areas of the BPSOU (CDM 1994). Potential human health risks were predicted using EPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead to predict blood lead levels from environmental exposure to lead.

The Preliminary RGs for lead were developed according to EPA's Risk Assessment Guidance for Superfund. Site-specific inputs were used for lead in soil, house dust, and the bioavailability of lead in soil. A bioavailability of 10 percent was used for soil



and indoor dust, respectively, based on bioavailability studies in both monkeys and swine. The remainder of the risk equation input variables were default values recommended by EPA guidance and the EPA toxicologist to define the reasonably maximum exposed individual. Based upon the IEUBK Lead Model developed for the BRA for Lead, EPA derived a preliminary remedial goal of 1,200 mg/kg for residential soils and a preliminary RG of 2,300 mg/kg for non-residential soils to maintain a blood-lead level of 10 µg/dL or less for at least 95 percent of the children between the ages of zero and 6 years, which is within EPA targeted risk range. The Preliminary RGs for the cleanup of lead contaminated soils in residential and non-residential areas within the BPSOU were mandated and published in the Priority Soils NTCRA action memorandum and Proposed Plan.

### **7.1.3 Baseline Human Health Risk Assessment for Arsenic**

The BRA for arsenic was completed in 1997 to evaluate potential human health risks associated with exposure to arsenic in residential areas of the BPSOU. As a known carcinogen, arsenic may pose both cancer risks and non-cancer risks. The Preliminary RGs for arsenic were developed according to EPA's Risk Assessment Guidance for Superfund. Site-specific inputs were used for arsenic in soil and house dust, and the bioavailability of arsenic in soil. Bioavailability of 18 and 25 percent were used for soil and indoor dust, respectively, based on bioavailability studies in both monkeys and swine. The remainder of the risk equation input variables were default values recommended by EPA guidance and the EPA toxicologist to define the reasonably maximum exposed individual. Preliminary RGs were calculated representing cancer risks of 1 in 10,000, 1 in 100,000 and 1 in 1,000,000. Under the reasonable maximum exposure scenario, the selected Preliminary RG of 250 mg/kg represents a 1 in 19,040 cancer risk, which is within EPA targeted risk range.

### **7.1.4 Technical Memorandum: Addendum to the Baseline Human Health Risk Assessment; Evaluation of Human Health Risks Associated with Exposure to Alluvial Ground Water**

Neither the BRA for Lead nor the BRA for Arsenic evaluated human health risks from exposure to contaminated groundwater at the BPSOU. This was because groundwater data representative of current site conditions were not available at the time these risk assessments were conducted. The LAO risk assessment did present conclusions regarding risks associated with ingestion of alluvial groundwater beneath LAO. However, this evaluation was limited to the LAO area and, more importantly, was conducted with data collected before the LAO removal and other removal actions at the BPSOU were complete. Therefore, when groundwater data more indicative of the current site conditions were collected, EPA determined that the potential human health risks associated with exposure to alluvial groundwater at the BPSOU should be assessed.

Based on hydrogeologic considerations, including the spatial extent of the alluvial aquifer, potential sources of contaminants, groundwater flow characteristics (flow direction and flow boundaries), and groundwater quality, the BPSOU was divided



into nine separate groundwater exposure units. Risk calculations were performed for each groundwater exposure unit independently.

Non-cancer risks (systemic risks) from ingestion of alluvial groundwater were found to be location and element specific. Blood lead levels in children would be unacceptable if groundwater in Lower Area One and Metro Storm Drain was ingested.

The risk assessment of the alluvial groundwater throughout the OU shows that cancer risks are driven by arsenic concentrations in groundwater and are unacceptable in major portions of Butte (Buffalo Gulch, West Side, Railroad Yards, Lower Area One, and the Metro Storm Drain exposure units), if actual exposure should occur.

### **7.1.5 Human Health Risk Assessment, Walkerville Residential Site**

In 2001, EPA performed a supplemental risk assessment to determine whether arsenic, lead, and mercury in outdoor soil and indoor dust presented an unacceptable health risk to children and adults living in Walkerville (UOS 2003). The Walkerville risk assessment was implemented to address concerns raised by the public regarding mercury contamination in Walkerville. Prior EPA risk assessments addressed arsenic and lead risks, which are the primary drivers of the residential cleanups.

The soils in residential yards, soil in earthen basements, and dust in living areas and attics of Walkerville were found to be sources of arsenic, lead, and mercury. In general, concentrations of these metals were highest in attic dust or basement soil, lower in outdoor soil, and lowest in indoor living area dust.

The risk assessment showed that lead in outdoor soil and indoor dust at Walkerville residences pose an unacceptable health risk to young children. Non-cancer risks for arsenic and (generally) mercury in outdoor soil and indoor dust are at acceptable levels.

The attic-use survey conducted by EPA in consultation with the Agency for Toxic Substances Disease Registry (ATSDR) concluded that, under normal conditions, people using their attics have a complete exposure pathway. The surveys and risk assessment show the frequency of attic use is very low and the risks are within EPA's acceptable risk range. The study found that home occupants suffer limited exposure to attic dust because they access attics on a limited basis and are exposed for a short duration. Using the survey finding, the risk assessment concluded that contaminants in attic dust do not generally pose unacceptable risk to occupants because a complete exposure pathway does not exist. In the event that a complete exposure pathway is created by activities such as remodeling or when an avenue of exposure is created by ceiling or wall deterioration, an unacceptable risk may occur.

Based on the results of the Walkerville risk assessment, EPA established an indoor residential action level for mercury vapor of  $0.43 \mu\text{g}/\text{m}^3$  and an action level of 147 mg/kg for mercury in residential soil. The previously established residential action



levels for arsenic (250 mg/kg) and lead (1,200 mg/kg) in soils were determined to be protective.

## 7.2 Ecological Risk

BPSOU is in an urban setting with limited natural terrestrial habitat. Due to the limited terrestrial habitat, risks to terrestrial ecological receptors were not determined. Aquatic habitat occurs along Silver Bow Creek, in adjacent wetland areas, and in surface water ponds used to control sediments. These aquatic environments are habitat for invertebrates, fish, waterfowl and other biota. Therefore, assessments of ecological risk in the BPSOU focused on aquatic environments.

Two ecological risk assessments have been conducted at the BPSOU:

- Preliminary Baseline Risk Assessment (PBRA) for the Lower Area One (LAO) Non-Time Critical Removal Action (N-TCRA) (CDM 1991); and
- Final Baseline Ecological Risk Assessment (BERA), Silver Bow Creek/Butte Area NPL Site, Butte Priority Soils Operable Unit (CDM 2001b).

The ecological portion of the PBRA focused of risks to ecological receptors inhabiting the portion of Silver Bow Creek within the BPSOU. This area is consistent with the area of primary ecological concern at the OU. The PBRA included:

- Identification of ecological site COCs
- Discussion of fate and transport mechanisms, site receptors, and exposure pathways
- Preliminary identification of assessment and measurement endpoints
- Evaluation of ecotoxicological effects and potential risks to aquatic receptors, using conservative toxicity values

Since the PBRA was conducted in 1991, numerous response action activities have been conducted at the BPSOU, including:

- Removal of tailings and other contaminated solid media from the Silver Bow Creek floodplain in LAO
- Reconstruction of the Silver Bow Creek channel through LAO
- Removal of arsenic and lead contaminated mine waste on the Butte Hill
- Construction of engineered caps over contaminated mine waste on the Butte Hill
- Residential yard replacement



■ Land reclamation

■ Construction of storm water controls

These response actions resulted in the removal or control of some sources of environmental contamination to Silver Bow Creek and have reduced the level of contaminants in the creek. Because the response actions altered the environmental conditions in Silver Bow Creek, ecological risks characterized in the PBRA were no longer representative of site conditions. As a result, EPA determined that further risk characterization was needed to determine the level of ecological risks (actual or potential) to aquatic receptors that continue to exist under current site conditions. The Ecological Technical Assistance Group (ETAG) for the BPSOU determined that the PBRA satisfied the requirements of the Screening-Level Ecological Risk Assessment (SERA) and, therefore, represented the initial two steps of the eight-step ecological risk assessment process for Superfund. The PBRA documents the presence of environmental risks associated with exposure to specific contaminants in wastes in the Silver Bow Creek floodplain and was a key factor in EPA's decision to take a response action at LAO.

Due to the urban setting at the BPSOU, terrestrial habitat is limited to non-existent. For this reason, EPA determined that terrestrial receptors would not be evaluated and focused the risk characterization on the aquatic environment. Animals in the aquatic environment may be exposed to toxic levels of contamination in the following ways:

- Fish and benthic macroinvertebrates may be exposed by breathing or touching surface water and sediment and by ingestion of prey or sediment.
- Waterfowl may be exposed by direct ingestion of surface water and sediments or by ingestion of contaminated prey.

To determine the level of current ecological risks in Silver Bow Creek, EPA initiated the BERA to evaluate risks to aquatic receptors in the creek from its origin at the confluence of Metro Storm Drain and Blacktail Creek to the Butte Metro Sewer discharge at the downstream (western) extent of the BPSOU. Also, the BERA evaluated risks to waterfowl in on-site ponds that were created during the removal of waste material in LAO. The BERA constituted the remaining six steps of the eight-step ecological risk assessment process for Superfund recommended by current EPA guidance.

The BERA was designed to quantify risks to ecological receptors under the current site conditions to determine the need for further remedial action. It included:

- Documentation of any risks to aquatic receptors from exposure to arsenic or metals that may continue in Silver Bow Creek (within the BPSOU) after the implementation of source area removals, assuming continued input of site contaminants to Silver Bow Creek from groundwater and surface water discharge.



- Identification of site contaminants that continue to pose ecological risks to aquatic receptors.
- Generation of information for making risk management decisions and evaluating remedial alternatives.

One of the RGs for the BPSOU site is to return the reach of Silver Bow Creek within the BPSOU to its beneficial uses, which include supporting a self-sustaining trout fishery. This implies that arsenic and metals concentrations and other chemical components in surface water and sediments cannot pose adverse effects to any life stage of fish, including the more sensitive larval and early fry stages, and the important prey species consumed by trout, such as benthic macroinvertebrates. To ensure that this remedial goal can be achieved, EPA identified additional management goals, beyond the main goal of assessing current ecological risk, for the BERA:

- Determine levels of contaminants that will allow a self-sustaining salmonid fishery in Silver Bow Creek, specifically, the establishment of brook trout and other fish species currently present in Blacktail Creek; and
- Determine levels of contaminants that will allow survival of salmonid species.

Primary contributors to ecological risk, based on the BERA evaluations, are identified as “major COCs”. They are:

- Surface water - cadmium, copper, manganese, and zinc
- Sediment - arsenic, cadmium, copper, lead, and zinc
- Waterfowl exposures - copper and zinc

Despite the response actions taken at LAO to remove wastes from the Silver Bow Creek floodplain and to minimize the impacts from contaminated groundwater, the risk characterization determined that hazard quotients (HQ) greater than 1 are still evident for both surface water and sediment within Silver Bow Creek. HQs greater than 1 indicate unacceptable environmental risks under EPA’s ecological risk assessment guidance. The risk characterization showed that the most hazardous ecological conditions at the BPSOU are in the tributary drainages to Silver Bow Creek (e.g., Missoula Gulch and Metro Storm Drain), which suggests that ecological conditions could still be improved with further remedial action.

Risk questions defined in the BERA are repeated below, along with responses, to summarize the results of the risk assessment.

- *Are levels of mining-related contaminants in surface water and sediment sufficiently elevated to adversely affect survival, growth, or reproduction of salmonid fish in Silver Bow Creek?* Yes. Salmonid fish are at risk from metals-contaminated surface water and sediment. Survival, growth, and reproduction are likely to be impaired at the most contaminated



locations. Although not quantitatively assessed, metals-contaminated sediments and prey are also expected to contribute to the overall risks to salmonid fish.

- *Are levels of mining-related contaminants in surface water and sediment sufficiently elevated to adversely affect the survival, growth, and reproduction of aquatic plants and aquatic invertebrates in Silver Bow Creek?* Yes. Sensitive aquatic invertebrates and some forms of aquatic plants are at risk from contamination of surface water and sediments.
- *Are the levels of mining-related contaminants in surface water, sediments, aquatic vegetation, and aquatic invertebrates sufficiently elevated to adversely affect the survival, growth, and reproduction of waterfowl frequenting Missoula Gulch Ponds and LAO Ponds?* Waterfowl may be at significant risk due to cadmium, copper, and zinc via ingestion of metals-contaminated sediments and food. Elevated risk estimates are directly related to assumptions on diet, foraging frequency, and COC concentrations. Risks are probably over-estimated because of conservative assumptions used where site-specific data are lacking. Contaminated pond surface water may also be of concern, mostly due to bioaccumulation potential rather than direct ingestion.

### 7.3 Remaining Risk

Although the previous response actions and the residential lead abatement program have reduced human health risks, metal-laden mine waste within the BPSOU continues to threaten human health and the environment, and continues to adversely impact local groundwater and surface water resources. As a result, the Selected Remedy builds upon the accomplishments of previous response actions to eliminate or mitigate remaining human and ecological risks.

The Selected Remedy includes, but is not limited to, the following major critical elements to address remaining risks:

- A site-wide operations and maintenance program for reclaimed sites to ensure permanence of the caps over mine waste.
- Alluvial groundwater collection and treatment along with appropriate institutional controls, ARAR waivers, and monitoring.
- Additional source removal, capping of mine waste and land reclamation for contaminated solid media.
- Plans for a Residential Metals Abatement Program that takes a multi-pathway approach to addressing arsenic, lead, and mercury in yards and homes. All residential properties will be sampled within the BPSOU with remediation when indicated.
- A phased storm water management program combining initial action, aggressive monitoring, source area stabilization, and engineering controls to minimize impacts from storm water runoff and return Silver Bow Creek to its beneficial uses.



- Elevated arsenic and metals occur in stream-bed and bank sediments in Silver Bow Creek at concentrations that present significant risks to aquatic biota. These sediments are most notable within the slag canyon west of Montana Street and within the upper reaches of the Silver Bow Creek channel in Lower Area One and the lower reach of Blacktail Creek. The Selected Remedy will remove contaminated sediments from the stream channel bottom and stream banks, and adjacent floodplain from above the confluence through the slag canyon to the reconstructed floodplain in Lower Area One.

## **7.4 Basis of Action**

The response actions selected in this ROD are necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.



## Section 8 Remedial Action Objectives and Remedial Goals

The Selected Remedy described in this ROD is intended to be the final remedial action for the BPSOU. EPA has identified site-specific human health and environmental remediation objectives and goals for groundwater, surface water, soils, indoor dust, and mining-related wastes in the BPSOU. Remedial Action Objectives (RAOs) are the final media-specific (e.g., solid media, surface water, etc.) statements regarding the objectives to be achieved by the remedial action. They address the various COCs, media of concern, exposure pathways and receptors, and current and likely future land use in the OU. Remedial Goals (RGs) are numerical cleanup goals for environmental media. The RGs are based on ARARs or are the results of baseline risk assessments for the BPSOU. Remedial actions implemented for the purpose of meeting RGs usually result in attainment of RAOs.

RAOs and RGs were prepared by EPA in accordance with NCP regulations, relevant guidance, and in consultation with DEQ. Consideration was also given to suggestions from the PRP Group and other interested parties and current site conditions. The Preliminary RAOs and RGs initially set by EPA were updated as the RI/FS progressed. The ROD establishes the final RAOs and RGs.

RAOs and RGs for air are not addressed as part of the BPSOU as stand-alone goals, although certain air standards may be ARARs during the conduct of cleanup actions (e.g., dust control). Air is not addressed because any chronic violations of air standards from CERCLA sources are not a pathway of concern at the OU.

In-stream sediments are not specifically addressed in the RGs. However, one goal of the previous response actions and future remedial actions for the OU is to eliminate or minimize sources of contamination to Silver Bow Creek sediment (i.e., surface water transport of contaminated soils or waste) such that excessively contaminated sediments are not present. Sediments were largely addressed during the Lower Area One ERA when the Silver Bow Creek floodplain was reconstructed and when the subdrain was installed in Metro Storm Drain. Additional sediments, defined geographically rather than in reference to specific action levels for sediments, will be addressed through sediment removal along the stream reach between the confluence and Lower Area One, as described in this ROD.

The following specific objectives were developed for each media. The objectives specify the COCs and the exposure routes and receptors at issue for cleanup. The objectives are followed by RGs in the form of ARARs or acceptable levels or ranges of levels for each exposure route.

### 8.1 Solid Media

Humans are the primary current and future receptors of arsenic and metals from contaminated soils, indoor dust, waste rock, and tailings (solid media) within the OU.



The primary exposure pathways are direct ingestion, incidental ingestion, and dermal contact with these media and the indirect inhalation of contaminated airborne indoor dust.

Solid media are a source of contamination to the underlying alluvial and bedrock aquifers via leaching of contaminants from solid media and the subsequent downward migration through the unsaturated (vadose) zone. Contaminated solid media are also a source of arsenic and metals to surface water within the OU via runoff and other transport.

Secondary exposure pathways for humans are potential direct ingestion, incidental ingestion, and dermal contact with surface and groundwater contaminated by solid media. Aquatic receptors are exposed to arsenic and metals from solid media in surface water and the surrounding environment. For solid media, the COCs are arsenic, lead, and mercury.

### **8.1.1 Remedial Action Objectives**

The RAOs for contaminated solid media in the OU are to:

- Prevent the ingestion of, direct contact with, and the inhalation of, contaminated soils, indoor dust, waste rock, and/or tailings or other process waste that would result in an unacceptable risk to human health assuming current or reasonably anticipated future land uses.
- Prevent releases of contaminated solid media to the extent that they will not result in an unacceptable risk to aquatic environmental receptors.
- Prevent releases of contaminated water from solid media that would result in exceedances of the Montana State Water Quality Standards for surface water.
- Prevent releases of contaminated water from solid media that would result in exceedances of the Montana State Water Quality Standards for groundwater, except where ARAR waivers are appropriate and other means to protect from associated risks are available.
- Remediate contaminated solid media to the extent that it will not result in an unacceptable risk to human health and/or aquatic environmental receptors.
- Prevent release of contaminated water from solid media that would result in degradation of surface water, in accordance with the surface water RGs.

### **8.1.2 Remedial Goals**

Human health risks from exposure to mining related lead and cadmium were evaluated through a series of baseline risk assessment documents that concluded in 1994 as described in Part 2, Section 7 of this ROD. That evaluation determined that human health risks at the OU from exposure to cadmium were not unacceptable to



EPA. Actual and potential risks from exposure to high levels of lead at the OU, however, were unacceptable.

In 1994, the baseline risk assessment for lead was conducted to evaluate potential human health risks associated with exposure to lead within residential areas of the BPSOU (CDM 1994). EPA derived action levels for lead at 1,200 mg/kg in residential yards and play areas (i.e., receptor areas) and 2,300 mg/kg at waste rock dumps or other source areas outside of residential areas to maintain a blood lead level of 10 µg/dl or less for at least 95 percent of the children between the ages of zero and 6 years. These action levels have been used to determine ongoing response actions, including use by Butte-Silver Bow County as part of the lead abatement program.

EPA completed an evaluation of the potential risks to human health from exposure to arsenic contaminated soil and waste rock within the OU. Three pathways of contact with mining-related arsenic were considered: ingesting or inhaling soils, indoor dust, and water and absorbing arsenic through the skin. Based on the risk assessment, EPA set action levels for arsenic. The arsenic action level for residential areas and rail beds that transect residential areas is 250 mg/kg. The commercial/industrial action level for arsenic is 500 mg/kg. The arsenic action level for open space areas that may be used for recreational purposes is 1,000 mg/kg.

In 2003, EPA finalized an additional evaluation of the potential human health risks to children and adults living in Walkerville related to exposure to arsenic, lead, and mercury in outdoor soil and indoor dust. Exposure scenarios considered included: ingestion of outdoor soil and indoor dust (basement soil, living area dust, and attic dust); inhalation of airborne dust from soil and indoor dust; and inhalation of indoor air vapor (mercury only). Based on the results of the Walkerville residential risk analysis, EPA established an indoor residential action level for mercury vapor of 0.43 micrograms per cubic meter (µg/m<sup>3</sup>) and an action level of 147 mg/kg for mercury in residential soil. Previously established residential action levels for arsenic (250 mg/kg) and lead (1,200 mg/kg) were determined to be protective for exposure to indoor dust, and were not changed.

All of these levels apply to areas where a completed pathway of exposure is present. For attic dust, a pathway of exposure is present when attics are remodeled and used or are otherwise altered or broken down in ways that create exposure. RGs for arsenic, lead and mercury will apply to attic dust when exposure pathways are present.

## 8.2 Groundwater

EPA's September 4, 2001 groundwater risk assessment addendum found unacceptable risk to human receptors from the potential use and ingestion of contaminated alluvial groundwater at the OU, primarily because of arsenic and lead contamination (CDM 2001). The RAOs and human health RGs associated with groundwater contamination at the OU are based on this potential risk. However, the general industrial nature of the area where groundwater exists, along with existing and planned institutional



controls regarding groundwater, may prevent the actual domestic use of the alluvial groundwater in Butte.

Groundwater COCs are arsenic, cadmium, copper, lead, mercury, and zinc.

## 8.2.1 Remedial Action Objectives

The remedial action objectives for contaminated groundwater are:

- Prevent ingestion of or direct contact with contaminated groundwater that would result in unacceptable risk to human health.
- Prevent groundwater discharge that would lead to violations of surface water ARARs and RGs for the BPSOU.
- Prevent degradation of groundwater that exceeds current standards.

## 8.2.2 Remedial Goals

Montana classifies groundwater into Classes I through IV based upon its specific conductance and establishes the groundwater quality standards applicable with respect to groundwater classification. Concentration of dissolved substances in Class I or Class II groundwater may not exceed the human health standards listed in the current Montana Numeric Water Quality Standards Circular DEQ-7 (DEQ-7) and shown in Table 8-1. None of the DEQ-7 levels are less stringent than the federally promulgated MCLs or non-zero MCLGs, so those standards are not identified here.

**Table 8-1**  
**DEQ-7 Standards for Groundwater**  
Record of Decision  
Butte Priority Soils Operable Unit  
Silver Bow Creek/Butte Area NPL Site

COC	Standard (Dissolved)
Arsenic	10 µg/L
Cadmium	5 µg/L
Copper	1,300 µg/L
Lead	15 µg/L
Mercury	2 µg/L
Zinc	2,000 µg/L

For concentrations of parameters for which human health standards are not listed in DEQ-7, ARM 17.30.1006 allows no increase of a parameter to a level that renders the waters harmful, detrimental, or injurious to the beneficial uses listed for Class I or



Class II water. RGs for groundwater may be revised downward, in order to achieve surface water quality standards and RGs. For arsenic, the current Federal MCL of 10 µg/L is the appropriate RG for arsenic in groundwater, along with the recently promulgated State standard of 10 µg/L.

EPA has evaluated the Technical Impracticability (TI) Evaluation document for the alluvial aquifer – a document that EPA completed prior to the release of this ROD – and all other relevant information in the Administrative Record regarding groundwater. EPA has waived the ARAR RGs for groundwater for the alluvial aquifer identified in the TI Evaluation and in this ROD. The groundwater RGs identified in Table 8-1 and this section of the ROD therefore apply only to groundwater outside of the waiver area, which may be defined during remedial design. Further explanation for the ARAR waiver is provided in Section 12 of Part 2 of this ROD.

### 8.3 Surface Water

There are a number of ARARs related to surface water and storm water control for the OU. The main requirements for the surface water regulations are compliance with Montana's water quality standards (DEQ-7, February 2006). EPA has set as its objective compliance with standards continuously throughout the entire reach of Silver Bow Creek in the OU and downstream, during base flow and storm water conditions.

The State has designated uses for Silver Bow Creek and has promulgated specific standards accordingly. These standards are as stringent as, or more stringent than, the federal water quality criteria. The most stringent human health or aquatic water quality criterion is applied. Silver Bow Creek must meet human health standards and not allow zones of acute aquatic life toxicity (i.e., mixing zones) or allow the aquatic life chronic 4-day average and the acute 1-hour (instantaneous) concentrations to exceed the DEQ-7 aquatic life criteria.

The recently-lowered federal human health standard for arsenic of 10 µg/L was adopted by the State in January 2006. This standard is the correct arsenic ARAR for Silver Bow Creek.

Silver Bow Creek (main stem) from the confluence of Blacktail Creek to Warm Springs Creek is classified "I" for water use. This classification was established to provide a framework for improving waters that have been impacted by human activities with the goal to return waters to beneficial uses.

The Metro Storm Drain (historic Silver Bow Creek channel) from the concentrator tailings pond down stream to Blacktail Creek has no regulatory classification. Blacktail Creek and Grove Gulch are classified "B-1" for their water use. Under both classifications, surface water quality will be restored and/or maintained to support the following uses: drinking; culinary; food processing; bathing; swimming; recreation, growth and propagation of fish (specifically salmonid for B-I creeks) and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial



water supplies. These beneficial uses are generally considered supported when the concentration of toxic, carcinogenic, or harmful parameters in these waters do not exceed the applicable standards specified in the DEQ-7 Circular.

Surface water COCs are aluminum, arsenic, cadmium, copper, iron, lead, mercury, silver, and zinc.

### **8.3.1 Remedial Action Objectives**

The RAOs for contaminated surface water are to:

- Prevent ingestion or direct contact with contaminated surface water that would result in an unacceptable risk to human health.
- Return surface water to a quality that supports its beneficial uses.
- Prevent source areas from releasing contaminants to surface water that would cause the receiving water to violate surface water ARARs and RGs for the OU and prevent degradation of downstream surface water sources, including during storm events.
- Ensure that point source discharges from any water treatment facility (e.g., water treatment plant, wetland, etc.) meet ARARs.
- Prevent further degradation of surface water.
- Meet the more restrictive of chronic aquatic life or human health standards for surface water identified in Circular DEQ-7 (Table 8-2) through the application of B-1 class standards, as more specifically described below.

### **8.3.2 Remedial Goals**

#### **8.3.2.1 Point Sources**

For point sources the chronic aquatic life and human health standards specified in Circular DEQ-7 or other applicable standards would apply, as described in EPA's February 2, 1999 letter to ARCO (EPA 1999b). Because the quality of water in Silver Bow Creek has improved to the point where I classification computations are no longer relevant or necessary, new point sources must meet the Circular DEQ-7 standards (Table 8-2). For B-1 waters, the I classification system for new point sources does not apply, and the standards specified in Circular DEQ-7 or other applicable standards would apply to both point source discharges or ambient water.

#### **8.3.2.2 In Stream Standards**

For in-stream standards and RGs, state water quality standards form the basis of the RGs. The arsenic RG is based on the maximum contaminant level (MCL), which was adopted by the state. None of the DEQ-7 levels are less stringent than the federally promulgated MCLs or non-zero MCLGs, so those standards are not identified here. The DEQ-7 standard for aluminum is based on dissolved concentrations. All other standards are measured based on the total recoverable amount of the identified chemical. For storm water run-off or "wet weather flows", acute aquatic life standards



promulgated under Circular DEQ-7 (February 2006) are the appropriate performance standards.

Table 8-2 shows the applicable water quality standards with which any remedial action must comply.

**Table 8-2**  
**Surface Water Quality Standards**  
Record of Decision  
Butte Priority Soils Operable Unit  
Silver Bow Creek/Butte Area NPL Site

COC	DEQ-7 Standard	Standard <sup>1</sup> (Total)
Aluminum <sup>2</sup>	Acute Chronic	750 µg/L 87 µg/L
Arsenic <sup>3</sup>	Acute Chronic Human Health	340 µg/L 150 µg/L 10 µg/L
Cadmium	Acute Chronic	0.52 µg/L <sup>1</sup> 0.097 µg/L <sup>1</sup>
Copper	Acute Chronic	3.79 µg/L <sup>1</sup> 2.85 µg/L <sup>1</sup>
Iron	Chronic	1,000 µg/L
Lead	Acute Chronic Human Health	13.98 µg/L <sup>1</sup> 0.545 µg/L <sup>1</sup> 15 µg/L
Mercury	Acute Chronic Human Health	1.7 µg/L 0.91 µg/L 0.05 µg/L
Silver	Acute	0.374 µg/L <sup>1</sup>
Zinc	Acute Chronic	37 µg/L <sup>1</sup> 37 µg/L <sup>1</sup>
<b>Notes</b> 1. Standards for cadmium, copper, lead, silver, and zinc are hardness-dependent. Value shown is calculated at a hardness of 25 mg/L (Montana Numerical Water Quality Standards, Circular DEQ-7, February 2006). 2. The DEQ-7 standards for aluminum refer to the dissolved fraction. 3. The State adopted the Federal standard for arsenic in January 2006.		

Nitrate and fluoride in groundwater or surface water are not associated with mining in this OU, and therefore are not included on this list. Response actions to address these contaminants are outside the scope of the Selected Remedy.

In addition, the dissolved oxygen concentration must not be reduced below 3.0 mg/L; the pH must be maintained within a range of 6.5 to 9.5; no increases are allowed in the



physical properties (e.g., temperature, turbidity, solids [floating or suspended], color, etc.) which will or are likely to create a nuisance or render the water harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish or the wildlife; and no discharges of toxic carcinogenic, or harmful parameters may commence or continue which lower or are likely to lower the overall quality of these waters.

Finally, all substantive requirements of the Montana Pollutant Discharge Elimination System must be adhered to for point sources addressed or created in the remedial process.

For B-1 classification waters, non-degradation rules require that any surface water below the above standards must be maintained and protected unless degradation is allowed under the non-degradation rules.



## Section 9 Description of Alternatives

This section presents EPA's alternatives for achieving its objectives at the Butte Priority Soils OU. It briefly describes the alternatives studied, their interaction with past remedial actions, the estimated costs for each alternative, their common elements, and how they differ from one another.

This section provides a detailed description of each alternative so that Section 10 (The Comparative Analysis of Alternatives) can focus on the differences and similarities among the alternatives with respect to the nine NCP criteria. As an introduction, this section briefly describes the development of the alternatives and how previous response actions were integrated into the FS. Due to the complex nature of this OU, remedial alternatives were developed for the various media throughout the entire OU and a separate set of alternatives were developed to address the specific issues of the MSD area. To promote a better understanding of each alternative, the descriptions provided in this section are separated into 1) Site-Wide alternatives and 2) Metro Storm Drain alternatives. The comparative analysis of alternatives in Section 10 integrates these sets of alternatives into "comprehensive" alternatives.

### 9.1 Development of Alternatives

EPA screened potential cleanup technologies as the first phase of the FS. The screening process identified all the technologies that were potentially feasible for treating or remediating inorganic contaminants in groundwater, surface water, sediment, and soil/mine waste. It then evaluated these technologies for their effectiveness and implementability.

The FS report considered a wide range of media-specific remedial alternatives and special geographic and land use components within the OU. Each component identified for consideration in the FS contained its own unique set of characteristics, including factors such as proximity to surface water bodies or groundwater, potential to impact storm water quality, ground and surface water interaction, potential for development or other uses, or historical significance.

Remedial alternatives for the Metro Storm Drain area were evaluated in the site-wide FS and also in the *Focused Feasibility Study, Metro Storm Drain* (FFS) which provided a greater degree of evaluation and alternative development. The FFS presented additional analysis and interpretation of data resulting from site investigation activities performed by EPA and the Montana Bureau of Mines and Geology after the site-wide FS was drafted.

### 9.2 Integration of Past Response Actions

CERCLA, or the Superfund law, requires past response actions to be designed and constructed in a manner consistent with a final remedy if possible and requires EPA to ensure an orderly transition from removal action to remedial action. Before deciding if past response actions would be compatible with the final remedy, EPA



evaluated whether the past response actions were consistent with the cleanup objectives and ARARs. That assessment was published in the Response Action Summary Document (October 2, 2003). The assessment concluded that all but three past removal actions complied with ARARs and were consistent with the cleanup objectives established for the final remedy.

Based on the Response Action Summary Document and the administrative record for past response actions, EPA granted a conditional, limited no further action status to all past response action sites, except the Colorado Smelter removal site, Lower Railroad Yard Site 1, and the LAO removal site. However, for sites granted the no further action status, EPA, in consultation with the State, may still select additional actions in the final cleanup plan to address protectiveness or ARAR compliance issues at these sites. These potential additional actions include, but are not limited to: specific management practices, storm water controls, groundwater protection measures, and cap modifications.

EPA has also developed the Butte Reclamation Evaluation System to ensure that reclaimed areas will remain stable and protective. This system is a site-specific tool to evaluate the stability, integrity, and degree of human and environmental protectiveness afforded by EPA-sanctioned response actions initiated on lands impacted by mining within the OU. This system will evaluate, through routine inspections, the:

- Condition and diversity of vegetative cover
- Presence of erosion
- Condition of site edges
- Presence of exposed waste material
- Presence of bulk soil failure or mass instability
- Presence of barren areas or gullies

This system includes corrective action triggers and a database to track trends and schedule maintenance and future field evaluations. The final BRES is attached as Appendix B.

Along with developing findings under the BRES, an operation and maintenance plan will be developed for reclaimed areas. This program will ensure long-term effectiveness and permanence for these areas. Institutional Controls (ICs) are necessary to protect the remedy and human health, and are therefore a component of every alternative, including the preferred alternative. Further details on ICs are provided in subsequent sections of this ROD.

Detailed operation and maintenance of sites where past response actions have occurred is required by the Selected Remedy. Past response actions are also subject to



five-year reviews to ensure that the cleanup actions remain protective. The Butte Reclamation Evaluation System program will ensure long-term effectiveness and permanence for all capped wastes and reclaimed areas.

### 9.3 Remedial Alternatives

For simplicity, the descriptions of alternatives in this section are separated into two sets: Site-Wide and Metro Storm Drain remedial alternatives. Following the listing of the major components of each alternative, commonalities and differences of the alternatives are presented. The detailed comparison of the alternatives in Section 10 integrates the Metro Storm Drain alternatives with the Site-Wide alternatives; these combined alternatives are then referred to as “comprehensive” alternatives.

#### *Site-Wide Alternatives*

The Site-Wide alternatives developed for the OU are:

- Alternative 1 - No Further Action.
- Alternative 2 - Engineered covers/Partial Removal for Solid Media, Treatment of LAO Groundwater, Surface Water best management practices (BMPs), ICs, and Monitoring.
- Alternative 3 - Engineered covers/Partial Removal/Limited Treatment for Solid Media, Groundwater Collection and Redirection to the Berkeley Pit, Surface Water BMPs, ICs, and Monitoring.
- Alternative 4 - Engineered covers/Partial Removal/Limited Treatment for Solid Media, Groundwater Collection and Lime Treatment, Surface Water BMPs, ICs, and Monitoring.
- Alternative 5 - Engineered covers/Partial Removal/Limited Treatment for Solid Media, Groundwater Source Material Partial Removal/Collection and Lime Treatment, Surface Water BMPs, ICs, and Monitoring.
- Alternative 6 - Source Material Removal, Groundwater Source Material Removal/Collection and Lime Treatment, Surface Water BMPs, ICs, and Monitoring.

#### *Metro Storm Drain Area Alternatives*

These alternatives were developed in the *Focused Feasibility Study, Metro Storm Drain* to augment the Site-Wide alternatives. Each consists of water treatment and/or waste removal options. Groundwater collection and treatment in this area of the site is intended to prevent discharge of contaminated base flow to Silver Bow Creek. Source removal options are intended to remediate alluvial groundwater within the Metro Storm Drain area.

- Alternative 1 - No Further Action.
- Alternative 2 - Capture and Treatment of Metro Storm Drain Base Flow.



- Alternative 3 – Removal of Accessible Diggings East and North Side Waste Materials (92,580 cubic yards with 35,750 cubic yards of overburden).
- Alternative 4 – Combination of Alternatives 2 and 3: Groundwater Capture and Treatment with Removal of Diggings East and North Side Tailings. Accessible waste material, (92,580 cubic yards with 35,750 cubic yards of overburden) would be removed.
- Alternative 5a – Removal of All Accessible Waste Material in the Metro Storm Drain with Groundwater Capture and Treatment. Total of 480,949 cubic yards of waste and 83,192 cubic yards of overburden from Parrott Tailings and Metro Storm Drain below Harrison Avenue (North Side Tailings, Diggings East Tailings, and the Lower Metro Storm Drain).
- Alternative 5b – Removal of Accessible Waste Material in the Metro Storm Drain with Removal and Reconstruction of the City-County Shops and Groundwater Capture and Treatment. A total of 779,684 cubic yards of waste and 103,735 cubic yards of overburden from the Parrott Tailings and Metro Storm Drain below Harrison Avenue (including the North Side Tailings, Diggings East Tailings, and the Lower Metro Storm Drain) would be removed.
- Alternative 6 – Total Removal of All Waste in the Metro Storm Drain with Groundwater Capture and Treatment. Total removal is 1,397,161 cubic yards of waste with 775,832 cubic yards of overburden for the entire area. All buildings, including residences and a shopping center, would be removed.

## 9.4 Common Elements of the Site-Wide Alternatives

### *Site-Wide Alternatives*

The different Site-Wide alternatives have many elements in common.

- ***Operation and Maintenance/ Corrective Actions.*** All alternatives require long-term operation and maintenance of waste caps, solid media, and vegetation consistent with standards set in the Butte Reclamation Evaluation System. Areas that were reclaimed outside an EPA Order will be inspected to determine whether those previous actions are protective or if additional actions are warranted. Operation and maintenance of the LAO collection system and storm water system will continue, as will the monitoring of storm water and groundwater.
- ***Institutional Controls.*** All of the alternatives require the use of institutional controls to limit access to solid media and groundwater and maintain the integrity of the cleanup.
- ***Engineered Covers.*** Alternatives 2, 3, 4, and 5 specify the use of soil with revegetation, or rock, asphalt, or concrete covers for areas exceeding lead and arsenic action levels. Multimedia covers would also be used under specific conditions. Consolidation of wastes and grading is also specified for these areas in each of the alternatives.



- ***Partial Removal of Material.*** Alternatives 2, 3, 4, and 5 require limited, partial removal of areas exceeding lead and arsenic action levels. Areas that were reclaimed, but not under an EPA Order, will be evaluated to determine whether previous actions are protective or additional actions will be required. Residential soils exceeding lead, arsenic, or mercury action levels will be remediated pursuant to the Residential Metals Abatement Program described in other sections.
- ***Site Specific Reclamation of Certain Areas.*** Reclamation will be conducted for the area adjacent to the Granite Mountain Memorial Area. The Syndicate Pit will be reclaimed to the maximum extent practicable to allow site reuse as a mine training center. The reclamation will include rock covers, parking lot cap and vegetation soil cover over various portions of the pit. The design consists of a west rim berm planted with trees and various surface water controls on the west side of the pit. Surface water controls (e.g., curbs and gutters) will be implemented to direct storm water to the Syndicate Pit. The pit base would continue to be used as a sediment catch basin.
- ***Treatment of Wastes.*** Alternatives 3, 4, and 5 specify the use of waste treatment of mine wastes that fail TCLP testing to reduce toxicity and mobility.
- ***Indoor Residential Contamination.*** Alternatives 3, 4, and 5 specify soil and dust sampling and clean up, an attic dust program, and other actions to reduce human health risk.
- ***Closure of Waste Repository.*** All alternatives specify the closure of the waste repository and siting of new repositories as necessary.
- ***Storm Water BMPs.*** All alternatives except No Action require use of specific types of management, where appropriate. This may include source removals and controls, engineering controls, sedimentation basins, and routing. A phased approach will be used to determine the need for these management techniques.
- ***Sediment Removal.*** All alternatives, except no action, specify the removal of sediments and bank/overbank material from Silver Bow Creek in the reach from the confluence of Blacktail Creek and Metro Storm Drain to the point in Silver Bow Creek where the stream was reconstructed at Lower Area One.
- ***Collection of Storm Water Runoff and Treatment.*** All alternatives, except no action, specify that storm water runoff will be collected and treated or directed to the Berkeley Pit, if BMPs do not achieve cleanup goals.
- ***Collection, Routing, and Treatment of Groundwater.*** All of the alternatives specify that groundwater collected at LAO (in the hydraulic control channel and hydraulic control pond CT-04) will be treated. The differences among alternatives are in the type of treatment and the routing. Alternatives 4, 5, and 6 specify treatment by lime precipitation and discharge to Silver Bow Creek.



### ***Metro Storm Drain***

- ***Waste Removal.*** Alternatives 3, 4, 5a, 5b, and 6 all require some volume of waste removal. The difference is whether the removal is limited to the removal of accessible wastes or if structures will be removed to excavate otherwise inaccessible wastes.
- ***Collection, Routing, and Treatment of Groundwater.*** Alternatives 2, 4, 5a, 5b, and 6 all require capture of contaminated groundwater in the Metro Storm Drain and routing to Lower Area One for treatment.

## **9.5 Distinctions Among Alternatives**

The following is a description of the elements that make each alternative unique, these elements may include RAOs to be achieved, estimated quantities of material to be removed, implementation requirements, key ARARs, future land use, estimated time to complete, or estimated costs.

### ***Site-Wide Alternatives***

- ***Cost.*** Costs vary widely with each alternative but are primarily driven by variations in volumes of waste that are considered for removal. Long-term O&M costs do not vary significantly across alternatives because these costs are driven primarily by groundwater treatment costs and the surface water management program. Estimated present value costs for each alternative are presented in Section 9.6.
- ***Operation and Maintenance.*** Alternatives that call for total removal of upland solid media source areas, residential yard soils, and contaminated interior and/or attic dust will require less O&M and/or institutional controls than partial removals. Where contaminated materials are completely removed, there will be no need for future programs to address contaminated solid media. This is not true for saturated wastes in the floodplain area. Groundwater capture and treatment and the associated O&M activities will be required over the long-term even if wastes are removed from the floodplain because of the residual contaminants in the groundwater and alluvial aquifer matrix, which will remain for over 100 years following removal.
- ***Volume of Material Removed.*** The volume of waste removed varies with each alternative. For Alternative 1, no more waste would be removed. Alternative 6 specifies total removal of all wastes exceeding lead and arsenic action levels. Because all contaminated materials will be removed, no covers would be required. Under Alternative 6, the Granite Mountain Memorial Area would be regraded and covered, and all slopes in the Syndicate Pit area would be regraded and capped with soil, and the site would not be used as mine training center or as a sediment basin.
- ***Lead Intervention and Abatement Program.*** For Alternative 1, the lead intervention and abatement program would be discontinued.
- ***Indoor Residential Contamination.*** Alternatives 1 and 2 have no provisions to address indoor residential contamination. Alternative 6 specifies a one-time cleaning of the



residential interior at properties undergoing yard cleanup or as part of a program to reduce the risk from dust during remodeling activities.

- **Collection, Routing, and Treatment of Groundwater.** Three of the alternatives (4, 5, and 6) require lime treatment of LAO groundwater and discharge to Silver Bow Creek. Alternatives 1 and 2 specify treatment with lime in lagoons in a wetland setting, similar to those evaluated during treatability studies, prior to being discharged to Silver Bow Creek. Alternative 3 specifies that the groundwater would be collected and conveyed via pipeline directly to the Berkeley Pit or to the Berkeley Pit treatment plant for combined treatment with water from the Berkeley Pit.
- **Use of Extraction Wells.** Alternative 6 would add the use of extraction wells installed at the west end of LAO to minimize migration of contaminants.
- **In-stream Flow Augmentation.** Alternative 2 specifies that groundwater base flow in the Metro Storm Drain would not be treated but would be augmented with clean water so that water quality standards are met in Silver Bow Creek.

#### ***Metro Storm Drain***

- **Volume of Material Removed.** Alternatives 3, 4, 5a, 5b, and 6 require some volume of waste removal. Alternatives 3 and 4 both remove only accessible wastes (92,580 cubic yards with 35,750 cubic yards of overburden). Alternative 5a broadens the removal area to include the Parrott tailings (except those under the City-County Shops) for a total of 480,949 cubic yards of waste and 83,192 cubic yards of overburden. Alternative 5b removes the City-County Shops to access more of the Parrott tailings (779,684 cubic yards of waste and 103,735 cubic yards of overburden). Alternative 6 removes all surface structures (including a shopping center and residences) and removes a total of 1,397,161 cubic yards of waste with 775,832 cubic yards of overburden.
- **Collection, Routing, and Treatment of Groundwater.** Alternatives 1 and 3 do not specify collection, routing, and treatment of groundwater from the Metro Storm Drain. Specifically, Alternative 3 evaluated the effectiveness of waste removal alone without groundwater capture and treatment and determined that removal alone would not be protective of Silver Bow Creek.

## **9.6 Comprehensive Alternatives**

To develop the comprehensive alternatives, the Metro Storm Drain alternatives were integrated into Site-Wide alternatives. For example, Comprehensive Alternative 3 includes the components of Site-Wide Alternative 3 and Metro Storm Drain Alternative 2 (Table 9-1). Similarly, Comprehensive Alternative 5 includes the components of Site-Wide Alternative 5 and Metro Storm Drain Alternatives 4, 5a, and 5b. Table 9-2 shows the matrix of comprehensive alternatives in order to more simply present the components of each comprehensive alternative.



**Table 9-1**  
**Comprehensive Alternatives Basis**

Comprehensive Alternative =A+B	Site-Wide FS (A)	Metro Storm Drain FFS (B)
1	1	1
2	2	1
3	3	2
4	4	2
5	5	4, 5a, 5b
6	6	6

Table 9-3 presents the estimated total costs for each alternative. Costs are broken down into capital costs and O&M costs to better show where costs are incurred and how costs vary across different alternatives and for different media. For this ROD, present value costs were estimated for 100 years using a discount factor of 3 percent. A 100-year period of analysis was selected because the incremental present worth cost beyond this time becomes relatively insignificant. The 3 percent discount factor at 100 years is 0.052. For example, if a cost of \$1,000,000 were anticipated in year 100, the present value of this cost would be \$52,000. When comparing alternative costs in the tens or hundreds of millions of dollars, these costs are insignificant by comparison. However, even though costs are estimated for 100-year duration, this should not be confused with the actual project duration. For example, groundwater treatment alternatives will be required well beyond 100 years, if not in perpetuity. Because all alternatives will require O&M in perpetuity, use of a consistent 100-year timeframe for all alternatives is appropriate to yield relative comparisons among the alternatives.

As was mentioned briefly in Section 9.5, alternative cost differences are driven by removal costs in the alluvial aquifer in Metro Storm Drain and Lower Area One. Because all alternatives will require some sort of O&M, regardless of removal, O&M costs do not vary significantly across alternatives.



**Table 9-2**  
**Matrix of Comprehensive Alternatives**

Alternatives	Comprehensive Alternatives					
	1	2	3	4	5	6
<b>SOLID MEDIA</b>						
1. No Further Action <sup>1</sup>	Waste cover, solid media, and vegetation O&M	Waste cover, solid media, and vegetation O&M	Same as 2	Same as 2	Same as 2	Same as 2
2. Institutional Controls (ICs)	Existing ICs	ICs as appropriate	Same as 2	Same as 2	Same as 2	Same as 2
3. Soil, Rock Cover, & Revegetation		Covers for areas exceeding Pb and As action levels	Same as 2	Same as 2	Same as 2	
4. Asphalt/Concrete Cover		Criteria as above; these covers would only apply in site-specific conditions	Same as 2	Same as 2	Same as 2	
5. Consolidation/Grading		In conjunction with partial removal and covers	Same as 2	Same as 2	Same as 2	
6. Removal		In areas exceeding Pb and As action levels	Same as 2	Same as 2	Same as 2	
7. Total Removal						All mine-impacted material exceeding Pb or As action levels
8. Multimedia Cover		These covers would only apply in site-specific conditions (e.g., wastes with toxicity characteristic leaching potential)	Same as 2	Same as 2	Same as 2	
9. Treatment <sup>2</sup>			Treat certain waste areas to reduce toxicity and mobility	Same as 3	Same as 3	
10. Residential Yards		Removal >Pb, As, and Hg action levels <sup>3</sup>	Same as 2	Same as 2	Same as 2	All mine-impacted material >Pb, As, and Hg action levels
11. Indoor Residential Contamination			Soil and dust barriers, removal, dust remodeling program and/or other actions to reduce human health risk	Same as 3.	Same as 3.	One-time cleaning of residential interior for properties undergoing yard remediation; dust remodeling program
12. Waste Repository Closure		Close Repository	Same as 2	Same as 2	Same as 2	Same as 2

1 No Further Action implies that no response action will be taken in areas where a response has not previously been implemented and, areas where a response action has been conducted will be operated and maintained. Additionally, the remedial action for the Priority Soils OU will, at a minimum, include any and all remedial alternatives that have been mandated by a previous administrative order.

2 Method for treatment to be determined in Remedial Design. Water treatment may entail routing to Berkeley Pit treatment system.

3 A programmatic approach will be utilized to address residential yards, taking into account established action levels and sensitive populations.

4 Accessible indicates that wastes are not obstructed by a permanent feature such as a building, municipal infrastructure, or other structure that EPA considers having value sufficient to prohibit demolition for the purpose of removing the wastes.



Section 9  
Description of Alternatives

**Table 9-2 (Cont.)**  
**Matrix of Comprehensive Alternatives**

Alternatives	Comprehensive Alternatives					
	1	2	3	4	5	6
<b>GROUNDWATER</b>						
1. No Further Action <sup>1</sup>	Groundwater monitoring, operation of LAO collection system	Same as 1	Same as 1	Same as 1	Same as 1	Same as 1
2. Institutional Controls (ICs)	Existing ICs	ICs as appropriate	Same as 2	Same as 2	Same as 2	Same as 2
3. In-Stream Flow Augmentation		Augment MSD base flow to the extent necessary to meet DEQ-7 Standards in SBC.				
4. Collection, Routing, and Treatment <sup>2</sup>	Treatment of LAO groundwater per ERA	LAO groundwater collected and treated by lime treatment in lagoons in a wetland setting.	LAO and MSD groundwater flow collected and redirected to the Berkeley Pit	Routing as needed to facilitate collection and treatment of LAO and MSD groundwater flow	Same as 4.	Same as 4.
5. Source Control		Saturated solid media left in place	Same as 2	Same as 2	Accessible <sup>4</sup> and saturated solid media partial removal	Total saturated solid media removal
<b>SURFACE WATER</b>						
1. No Further Action	Surface water monitoring, O&M of Storm Water TCRA facilities	Same as 1	Same as 1	Same as 1	Same as 1	Same as 1
2. Institutional Controls (ICs)	Existing ICs	ICs as appropriate	Same as 2	Same as 2	Same as 2	Same as 2
3. Best Management Practices (Source Controls, Engineering Controls, Sedimentation Basins, Routing)		Where Appropriate	Same as 2	Same as 2	Same as 2	Same as 2
4. In-Stream Flow Augmentation		Where Appropriate	Same as 2	Same as 2	Same as 2	Same as 2
5. Sediments Removal		Slag canyon and upper reaches of reconstructed channel in SBC	Same as 2	Same as 2	Same as 2	Same as 2
6. Collection/Treatment of Storm Water Runoff		Storm flow and base flow collected <sup>5</sup> and treated as required beyond implementation of BMPs	Same as 2	Same as 2	Same as 2	Same as 2

- 5 BMPs will be implemented as appropriate and to the extent necessary to mitigate soil erosion and contaminant transport at specific locations at the site. The remedial goal for BMPs is to achieve in-stream surface water quality standards (DEQ-7) in Silver Bow Creek for normal flow and runoff conditions. Individual BMPs will be designed to a location-specific basis and approved by the Agencies. If it is demonstrated that surface water quality standards cannot be achieved with BMPs alone, the Agencies will require surface water (including storm water runoff) treatment.
- 6 Storm water runoff flows up to specific design if other storm water response actions do not meet DEQ-7 standards. Treatment may entail routing to the Berkeley Pit treatment system.



**Table 9-3**  
**Costs of Each Comprehensive Alternative**  
**Record of Decision**  
*Butte Priority Soils Operable Unit*  
*Silver Bow Creek/Butte Area NPL Site*

	Comprehensive Alternative 1	Comprehensive Alternative 2	Comprehensive Alternative 3	Comprehensive Alternative 4 (Preferred Alternative)	Comprehensive Alternative 5	Comprehensive Alternative 6
<b>Capital Costs</b>						
<i>Solid Media</i>	–	\$16.3	\$20.1	\$33.4	\$20.1	\$44.7
<i>Groundwater</i>	–	\$0.09 – \$2.5	\$6.3	\$2.2	\$11.3 – \$57.1	\$221.8
<i>Surface Water</i>	–	\$3.3 – \$13.9	\$3.3 – \$13.9	\$21.3 – \$37.4	\$3.3 – \$13.9	\$3.3 – \$13.9
<i>New Capital Costs</i>	–	\$31	\$31	–	\$31	\$31
<b>Total Capital Costs</b>	<b>\$0.05</b>	<b>\$49.8 – \$62.7</b>	<b>\$59.8 – \$70.4</b>	<b>\$57.0 – \$73.1</b>	<b>\$64.7 – \$121.1</b>	<b>\$300 – \$310</b>
<b>O&amp;M Costs</b>						
<i>No Further Action</i>	\$24.1	\$24.1	\$15.8	–	\$15.8	\$15.8
<i>Solid Media</i>	–	\$0.8	\$0.8	\$10.9	\$0.8	\$2.3
<i>Groundwater</i>	–	\$9.3 – \$14.0	\$15.8	\$13.3	\$16.9 – \$17.1	\$18.2
<i>Surface Water</i>	–	\$20.5 – \$40.5	\$20.5 – \$40.5	\$27.7 – \$58.6	\$20.5 – \$40.5	\$20.5 – \$40.5
<b>O&amp;M Costs</b>	<b>\$24.1</b>	<b>\$55.0 – \$79.9</b>	<b>\$53.0 – \$72.9</b>	<b>\$52.3 – \$83.3</b>	<b>\$54.8 – \$74.8</b>	<b>\$57.4 – \$77.4</b>
<b>Present Value Cost (100 years)</b>	<b>\$24.2</b>	<b>\$105 – \$143</b>	<b>\$113 – \$143</b>	<b>\$109.6 – \$156.6</b>	<b>\$119 – \$196</b>	<b>\$357 – \$388</b>

**Notes:**

All costs in millions of dollars

Costs were modified from those presented in the Final FS and Proposed Plan through escalating 2004 costs to 2006 costs, and using a discount factor of 3% instead of 7%. See Sections 12 and 14 for further discussion.

Insignificant costs are not displayed in the summary table above. These included: Capital Costs for no action alternative and institutional controls; O&M Costs for institutional controls; and Periodic Costs for 5-year reviews

For the preferred alternative, the "No Further Action O&M Costs were allocated as appropriate among solid media, groundwater, and surface water.

The costs for Alternatives 1, 2, 3, 5, and 6 have been modified from those presented in the Proposed Plan to be comparable relative to the modifications to Alternative 4 (escalation of 2004 costs to 2006 costs, and using a discount factor of 3% instead of 7%). However, the costs were not re-calculated as rigorously as those for Alternative 4 (see Section 12), and should be considered approximate for comparative purposes only. Capital costs were multiplied by an escalation factor of 1.174 (2004-2006). O&M Costs were multiplied by 1.174 and then the ratio of the discount factors at 99 years for 3 percent and 7 percent ( $31.547/14.268 = 2.211$ ). An additional \$31 million correction was added to account for the additional capital costs for the storm sewer system and shorter time frame for residential abatements and called "New Capital Costs".



Section 9  
*Description of Alternatives*

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## Section 10 Comparative Analysis of Alternatives

This section explains the rationale for selecting the Selected Remedy. It includes an evaluation of the strengths and weaknesses of each alternative in meeting the nine CERCLA selection criteria. The evaluation identifies the relative advantages and disadvantages of each comprehensive alternative, considers the tradeoffs of each, and explains the selection of the Selected Remedy. A comprehensive and more detailed evaluation of how each of the remedial alternatives fared against each of the nine selection criteria is provided in the FS report.

This comparison focuses on the significant areas of difference, especially the identification of any alternative that is clearly superior. Table 10-1 provides a visual summary and numeric scoring of the comprehensive alternatives relative to the threshold and balancing criteria.

The comparative analysis provided in this section falls into three groups:

- **Threshold criteria.** Requirements that each alternative must meet in order to be eligible for selection. They are 1) overall protection of human health and the environment and 2) compliance with ARARs (unless a waiver is justified).
- **Primary balancing criteria.** Used to weigh major trade-offs among alternatives. They are: 3) long-term effectiveness and permanence; 4) reduction of toxicity, mobility, or volume through treatment; 5) short-term effectiveness; 6) implementability; and 7) cost.
- **Modifying criteria.** They are: 8) community acceptance and 9) State acceptance.

The following discussions demonstrate how each of the comprehensive remedial alternatives fared with respect to the criteria in these three categories.





































### 10.1 Threshold Criteria

#### *Overall Protection of Human Health and the Environment*

Comprehensive Alternative 1 does not meet the threshold criteria for protection of human health and the environment. In contrast, Comprehensive Alternatives 3, 4, and 5 will provide a high level of achievement in meeting this criterion. Alternative 2 is expected to perform at a lower level than these because it would not include interior residential living space actions and because flow augmentation of Metro Storm Drain base flow would have less certainty in consistently meeting water quality standards than collection and treatment. Comprehensive Alternative 6 is predicted to have a moderate to high achievement of this criterion. Although this alternative would provide a high level of long-term protection, it would have greater short-term risks than the other alternatives due to the relatively large-scale nature of these actions. The



Section 10  
Comparative Analysis of AlternativesTable 10-1  
Evaluation of Comprehensive Alternatives

Alternatives		Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility or Volume Through Treatment	Short-Term Effectiveness	Implementability	Overall Score	Estimated Cost (\$ Millions)
1	No Further Action							15	24
2	Engineered Covers/Partial Removal for Solid Media, MSD Flow Augmentation, Treatment of LAO Groundwater, Sediment Removal in Silver Bow Creek, Surface Water BMPs (including treatment), ICs and Monitoring.							23	105 – 143 <sup>a</sup>
3	Engineered Covers/Partial Removal and Limited Treatment for Solid Media, LAO and MSD Groundwater Collection and Redirection to the Berkeley Pit, Surface Water BMPs (including Treatment), ICs and Monitoring.							24	113 – 143 <sup>a</sup>
4	Engineered Covers/Partial Removal and Limited Treatment for Solid Media, Lower Area One and Metro Storm Drain Groundwater Collection and Lime Treatment at LAO, Sediment Removal in Silver Bow Creek, Surface Water Best Management Practices (including treatment if necessary), Institutional Controls, and Monitoring							25	110 – 157 <sup>b</sup>
5	Eng.Covers/Partial Removal & Limited Treatment for Solid Media, Range of Partial Removal Options for Groundwater Source Material in MSD/LAO, MSD Groundwater Collection & Treatment, Sediment Removal in Silver Bow Creek, Surface Water BMPs (including Treatment), ICs & Monitoring.							22	119 – 196 <sup>c</sup>
6	Solid Media Removal of unreclaimed areas, Groundwater Source Material Removal/LAO and MSD Groundwater Collection and Lime Treatment, Sediment Removal in Silver Bow Creek, Surface Water BMPs (including Treatment), ICs and Monitoring.							17	357 – 388 <sup>a</sup>

● High achievement of criterion. Score = 5 points

● Moderate to high achievement of criterion. Score = 4 points

○ Moderate achievement of criterion. Score = 3 points

○ Low to moderate achievement of criterion. Score = 2 points

○ Low achievement of criterion. Score = 1 point

a. Low range indicative of groundwater treatment in existing Lower Area One Treatment Lagoons in a Wetland Setting and no storm water treatment. High range indicates lime treatment of both groundwater and storm water in separate and distinct treatment facilities.

b. Low range indicative of groundwater treatment in new conventional treatment plant at Lower Area One and no storm water treatment. High range indicates lime treatment of both groundwater and storm water in separate and distinct treatment facilities.

c. Low range indicative of groundwater treatment in existing Lower Area One Treatment Lagoons in a Wetland Setting, removal of Diggings East and North Side Tailings only in Metro Storm Drain, and no storm water treatment. High range indicates lime treatment of both groundwater and storm water in separate and distinct treatment facilities, and maximum removal of accessible wastes in Metro Storm Drain (including wastes beneath City-County Shop Complex).



greater short-term risks reduce Comprehensive Alternative 6's overall protectiveness ranking.

### *Compliance with ARARs*

The ability of the alternatives to meet contaminant-, location- and action-specific ARARs was evaluated. Alternative 1 would not meet ARARs. Alternatives 2, 3, 4, 5, and 6 would all meet ARARs, except for groundwater within the alluvial aquifer.

EPA does not believe that any of the removal alternatives at the Metro Storm Drain would lead to groundwater ARAR compliance in the next 100 years, because of the low flow rates and abundance of waste in the area. EPA has carefully evaluated the Technical Impracticability Evaluation and all of the relevant information in the Administrative Record. EPA waives groundwater standards within the alluvial aquifer under NCP Section 121(4)(c) and CERCLA Section 300.430 (f)(1)(ii)(c)(3) because it is not technically feasible to meet ARAR requirements within this aquifer, due primarily to the widespread contamination and the very slow overall movement of water flow within the aquifer<sup>4</sup>. Therefore, it is important to understand that under any scenario, a waiver of the Montana DEQ-7 human health standards for groundwater is necessary and appropriate.

## 10.2 Primary Balancing Criteria

### *Long-Term Effectiveness and Permanence*

For these criteria, the alternatives were evaluated primarily with regard to residual risk present under each comprehensive alternative and the adequacy of controls as follows:

- ***Magnitude of Residual Risk.*** This includes the potential future effects on human health and the aquatic ecosystem from exposure to contaminated soils/mine waste, groundwater, and surface water left at the site.
- ***Adequacy and Reliability of Controls.*** This focuses on the use and adequacy of controls, and the implemented or required best management practices.

The FS demonstrated that Comprehensive Alternatives 3 through 6 would provide a high level of long-term protection. Additionally, the detailed Butte Reclamation Evaluation System and monitoring program can ensure that risks are managed effectively with wastes left in place. Comprehensive Alternative 2 would provide a moderate to high level of long-term effectiveness and permanence, because there is less certainty that water quality standards would be met in portions of Silver Bow

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<sup>4</sup> See footnote 3, page D-12, for further classification of the scope of the ARAR waiver in this ROD.



Creek under base flow conditions than the other alternatives, which include collection and treatment of groundwater.

***Reduction of Toxicity, Mobility, or Volume through Treatment***

This criterion evaluated the alternatives based on the effectiveness of:

- Physically removing mine waste and contaminated soil
- Capping of contaminated media in-place
- Capturing and treating contaminated water
- Implementing best management practices, institutional controls, and monitoring programs

Since little active treatment of contaminated media would occur under any of the alternatives, the FS predicted that the alternatives would have a low to moderate ability to meet this criterion. Although the alternatives contain treatment components that will reduce toxicity, mobility and volume (e.g., groundwater collection and treatment with lime), most remedial components use engineered covers, removal, and administrative or engineering controls to effectively limit mobility and reduce risks. Alternatives that remove wastes at a higher rate for reduction of mobility, especially in the Metro Storm Drain.

The vast majority of mine wastes and contaminated soils are of large volume and low contaminant concentrations, which cannot be treated effectively. In addition, technical difficulties prevent effective treatment of the various metals present. Thus, active treatment was screened-out as a potential option for the solid media.

Mobility of waste is reduced by effective capping – a primary feature of Comprehensive Alternatives 3 through 5.

***Short-Term Effectiveness***

The evaluation of alternatives with respect to this criterion included consideration of the following sub-criteria:

- ***Protection of Community and Cleanup Workers during Cleanup.*** This included an evaluation of the volume of materials to be dealt with under each alternative and the time/safety elements. Alternatives involving in-place controls and less removal can be implemented quicker and with less construction activity and fewer traffic problems, and risks can be mitigated more quickly.
- ***Environmental Impacts of Implementation.*** These included impacts on aquatic ecosystems.
- ***Time until Cleanup Objectives are Achieved.*** The estimated time each alternative would take to achieve the remedial objectives and goals was evaluated under this sub-criterion.



The FS concluded that Alternatives 2, 3, and 4 would have a high level of achievement of this criterion. Implementation of any of these alternatives would result in a low level of risk to the community, cleanup workers, and the environment.

Removal and construction activities are performed with standard equipment, such as excavators and trucks. This type and scale of construction has been used extensively at the site and poses low risks to workers and to the community at large. Alternatives 5 and 6 would have an increasingly low ranking under this criterion because risks to the community and to workers would increase as more construction activity occurs.

Other risks, such as those from dust emissions and storm water runoff, also pose low risks under Alternatives 2, 3, and 4. Dust can be easily controlled using common engineering and construction techniques (e.g., water spray) and the migration of storm water can be readily mitigated using standard BMPs. Actions for groundwater (ICs, collection of Metro Storm Drain base flow, and redirection to a treatment plant) would require minor construction activities in the vicinity of the Metro Storm Drain and Lower Area One and would therefore pose a low risk.

Of the five action alternatives evaluated in the FS, the predicted implementation time until protection is achieved is the shortest for Alternatives 3 and 4. Alternative 5 and 6 are predicted to have a moderate and low achievement of this criterion, respectively, due to the time required to address the additional volume of waste material to be removed.

### ***Implementability***

Implementability was evaluated in the FS using the following sub-criteria:

- ***Technical Feasibility.*** This sub-criterion involves the ability to conduct and operate the technology, time required for remedial implementation, reliability of the technology, ability to monitor the effectiveness of the technology, and ease of undertaking additional action should it be necessary.
- ***Administrative Feasibility.*** This involves the ability to obtain approvals and coordinate with state and federal regulatory agencies, municipalities, and counties.
- ***Availability of Services and Facilities.*** The availability of needed equipment, specialists, materials (e.g., backfill and cover soil), and location and size of the area for disposal of waste and contaminated soils was evaluated.

Most alternatives would use standard construction equipment and controls. Engineered covers and partial removal of source materials and remediation of residential yards has proven technically feasible. Groundwater flow augmentation, collection, and redirection to the Berkeley Pit or collection and lime treatment (components of Alternatives 2 through 4) are expected to be readily implementable from a technical perspective.



The FS concluded that Alternatives 2 and 4 would have a moderate to high level of implementability, while Alternatives 3 and 5 would have a moderate level of implementability.

Alternative 6 is expected to have a low level of implementability as total removal of saturated solid media from Lower Area One and the Metro Storm Drain would require demolition and replacement of numerous structures, including the Metro Sewage Treatment Plant, City-County Shops, roads, pipelines, and other business/commercial operations. These operations would have to be relocated before saturated solid media removals could be implemented. It is likely that access for this type of work would be very difficult and expensive, as it would severely disrupt businesses over a 5- to 10-year period.

### ***Cost***

Net present worth costs for each alternative were compared in Tables 9-3 and 10-1. The range of costs for each alternative represents the range of possible scope of actions to address mine waste and contaminated soil on the Butte Hill, storm water runoff, the treatment of collected groundwater, and different Metro Storm Drain waste material options.

The FS showed that Alternative 6 and portions of Alternative 5, which address Metro Storm Drain removal, would not rank well under the cost-effectiveness criterion because they would not achieve benefits (cleanup of the aquifer) with certainty, would be difficult to implement, and would be very costly. Removal of waste in the Metro Storm Drain area may not meet groundwater RGs and would not eliminate the need for, and cost of, groundwater collection and treatment. This is a primary reason why the O&M costs across all alternatives do not vary significantly, regardless of the scope of the removal.

### ***Remedial Alternative Scores***

Based on the comparative evaluation of the alternatives against the threshold and balancing criteria, Alternatives 2, 3, 4, and 5 scored similarly. Alternative 6 scored significantly lower than the other alternatives primarily due to the lack of effectiveness, the increased risks during remediation, the difficulty of implementing a complete removal of waste material, and the low cost effectiveness of the alternative.

In examining these criteria and how each alternative scores under each criteria, EPA believes that Alternative 4 in combination with Alternative 2 from the Focused Feasibility Study, with some modifications, best meets the threshold criteria and provides the appropriate balance of trade-offs among the balancing criteria. EPA notes that, with appropriate operation, maintenance, and monitoring, a modified Alternative 4 can provide long term effectiveness, short term effectiveness, and overall cost effectiveness. It is also readily implementable. The mobility of contaminants will be effectively controlled and reduced, and there are good reasons why toxicity and volume are not significant for this Alternative.



### 10.3 Modifying Criteria

The FS examined the seven threshold and balancing criteria. The remaining two criteria, community and state acceptance, have been evaluated now that EPA has received positions from citizen's groups, Butte-Silver Bow County, the PRP Group, the State Natural Resources Damages program, the State, and the Tribes. Community and state acceptance of the Preferred Alternative has also been evaluated based on comments on the Proposed Plan.

#### *Community and State Acceptance*

The Montana DEQ generally supports the Selected Remedy, except for the decision to leave large volumes of waste in place above the alluvial aquifer. The State believes that significantly more weight should be given to Metro Storm Drain Alternative 5b that calls for removing the Parrott Tailings, Diggings East, and the North Side Tailings. The State's opinion is contained in its letter of partial concurrence, attached as Appendix C. Butte-Silver Bow County is generally supportive of the Selected Remedy, as long as it is accompanied by adequate assurances of funding for implementation. The County believes that economic development funding is a necessary companion step for any remedy in Butte. The County also believes that local implementation of the remedy is important.

Many other commenters were generally supportive of the remedy proposed in the Proposed Plan.

Regarding removal of the Parrott Tailings, public opinion varied. Most statements for removal called for Alternative 5b and restoration of Silver Bow Creek. On the other hand, business owners in the area voiced strong opposition to alternatives, such as Alternative 5b, that would cause them to incur economic hardship and disruption. Contractors were concerned about safety risks to the community due to heavy equipment. Many comments were highly technical concerning contaminant fate and transport. Butte Silver Bow was neutral in its comments on the MSD area removal issue, but wanted assurances that the remedy would be protective and that adequate funding and monetary compensation would be provided.

For some Butte and Walkerville residents and other Butte commenters, the primary concern is contaminated attic and other interior dust. Residents did not accept the "lack of pathways" finding in EPA's risk assessment and asked for removal and/or better risk characterization of attic dust.

Comments were also varied regarding waste left in place on the Butte Hill. There were a number of comments which were blanket statements in favor of removal. Others were more concerned about reclamation standards, long-term funding for maintenance of the caps, and ensuring that the presence of the waste did not hamper economic redevelopment. Some commenters questioned the permanence of the waste-in-place aspects of the proposed alternative presented in the Proposed Plan.



EPA sees general support among many commenters, including Butte-Silver Bow County, for the Selected Remedy, as long as the Selected Remedy can be adequately funded, planned, and implemented. EPA recognizes some community members' strong desire for more aggressive action regarding attic dust source removals and MSD area removals. When weighed with other remedy selection criteria, EPA does not believe the lack of uniform State or community acceptance of all aspects of the Selected Remedy outweighs the high ranking of Alternative 4 and the Selected Remedy regarding other criteria. EPA will work with the State and Butte-Silver Bow County and interested community members on issues of concern – an adequate attic dust program that will address attic dust cleanup when exposure pathways occur; well monitored and maintained areas of waste left in place using the highly developed BRES system; an effective groundwater monitoring and treatment system in the MSD and LAO area; and appropriate financial assurances and implementation plans to ensure the permanence of the Selected Remedy.

EPA also recognizes the lack of State support for the MSD area and alluvial groundwater remediation plans. EPA has worked closely with the State on all other aspects of the Selected Remedy. EPA's detailed responses to state concerns regarding the alluvial groundwater remediation issues are contained in the EPA Response to Comments on the Technical Impracticability Evaluation (EPA 2006b) and in the attached Part 3 Responsiveness Summary. Again, when EPA weighs the Selected Remedy and its high ranking relative to the other remedy selection criteria, the lack of State acceptance for this aspect of the Selected Remedy does not outweigh those other factors in this instance.



## Section 11 Principal Threat Wastes

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP §300.430(a)(1)(iii)(A)). Identifying principal threat wastes combines concepts of both hazard and risk. In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Conversely, non-principal threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. The manner in which principal threats are addressed generally will determine whether the statutory preference for treatment as a principal element is satisfied.

The concept of principal threat waste and non-principal threat waste, as developed by EPA in the NCP and guidance, is to be applied on a site-specific basis when defining source materials. "Source materials" are defined as material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration or contamination to groundwater, to surface water, to air, or act as a source for direct exposure. Mining and ore-processing wastes in the BPSOU come in several different forms, including mill tailings, waste rock, slag, smelter fallout, and mixed combinations of each. Arsenic and metals contained in these wastes can be released to soil, surface water, and groundwater. For the BPSOU, source materials are identified as those solid media (i.e., mining-related wastes and contaminated soils) that exceed remedial requirements for human health or have a potential or actual impact to aquatic environmental receptors, surface water quality, or groundwater quality. By definition, contaminated surface water, or groundwater are generally not considered source materials.

EPA has previously required the removal of the large volume of source material at Lower Area One, highly toxic mercury contamination, and other mobile and toxic source areas as part of these prior response actions. EPA has required, and will continue to require, the removal of contaminated yard and indoor dust material above health based action levels. Some additional removal of other source material may be required during remedial design or as otherwise described in Part 2, Section 12 of this ROD. Generally, however, remaining wastes can be effectively managed and controlled in-place. Thus, remaining source materials within the OU are not considered to be "principal threat wastes". Although present in large volumes, source materials within the BPSOU are low in toxicity, can be reliably contained, and present only a relatively low risk in the event of exposure. Arsenic, lead, and mercury exposure pathways are readily mitigated and managed through source controls and the Residential Metals Abatement Program.

The principal/non-principal threat concept and the NCP expectations were established to help streamline and focus the remedy selection process for a site. Independent of this determination, selected remedies must be protective of human



health and the environment, ARARs-compliant, cost-effective, and use permanent solutions or treatment to the maximum extent practicable. Engineering controls, such as capping of source materials, were found to be suitable for reliably containing source materials and limiting exposure. Treatment options were retained, however, for groundwater and surface water. The Selected Remedy utilizes a combination of engineering controls, treatment methods, and institutional controls, as appropriate, to achieve protection of human health and the environment.



## Section 12 Selected Remedy

Based on consideration of CERCLA requirements, the detailed analysis of remedial alternatives, State comments, and all public comments, EPA has determined that the preferred remedial alternative presented in the Proposed Plan, site-wide Alternative 4 in combination with Alternative 2 from the Focused Feasibility Study for Metro Storm Drain, as modified in this ROD, is the appropriate remedy for the BPSOU. The Selected Remedy includes components to address contaminated solid media (mine waste, soil, and residential soil and dust), surface water (base flow and storm water runoff), and alluvial groundwater. A detailed description of the Selected Remedy is presented in the sections below for solid media, groundwater and surface water.

### 12.1 Short Description of the Selected Remedy

#### 12.1.1 Solid Media

**Residential Contamination.** EPA's action levels for residential, commercial/industrial, and recreational soils and dust are:

**TABLE 12-1**  
**Soil, Dust, and Vapor Action Levels in Residential Areas**  
Record of Decision  
*Butte Priority Soils Operable Unit*  
*Silver Bow Creek/Butte Area NPL Site*

Contaminant of Concern	Exposure Scenario	Concentration
Lead	Residential	1,200 mg/kg
	Non-Residential	2,300 mg/kg
Arsenic	Residential	250 mg/kg
	Commercial	500 mg/kg
	Recreational	1,000 mg/kg
Mercury	Residential	147 mg/kg
	Residential (vapor)	0.43 $\mu\text{g}/\text{m}^3$

The Selected Remedy requires residential areas above these action levels, in yards or in indoor dust in living spaces, be remediated if a pathway exists.

Certain residential areas above these levels have been addressed previously under prior removal actions, but many homes and residences have not. The BSB Lead Intervention and Abatement Program, described in Section 12.3.1.1, has been addressing certain targeted homes and residences.

The Selected Remedy calls for the continuation and expansion of the BSB Lead Intervention and Abatement Program. The expansion of this program in the Selected



*Section 12*  
*Selected Remedy*

Remedy requires that all residential properties within the BPSOU must be sampled, assessed, and abated if action levels are exceeded, within a reasonable time frame, for arsenic, lead, and mercury. Abatement includes cleaning up yard soils, indoor dust, and attic dust as described below. Abatement can be done through the existing program, and can be integrated with the comprehensive abatement components of the existing program, which are already established.

If the Superfund remedial requirements are incorporated into the existing and expanded comprehensive program, complete indoor and outdoor assessment (i.e., residential yard soil, indoor and outdoor dust, non-living space dust, lead-based paint, drinking water, and mercury vapor) of all residential properties that are known to be occupied or expected to be occupied must be completed within 8 years of the initiation of the expanded program. During this 8-year period, the cleanup of residential properties that exceed the actions levels will occur in concert with the assessment program. The Selected Remedy requires the assessment and abatement activities be completed in no later than 15 years. This program will be a point of focus during the five-year review process to determine if changes need to be made to improve the program.

As described earlier, it is EPA's preference for this program to be done in conjunction with the remediation of other lead and metal sources, such as indoor plumbing, indoor lead-based paint, and exterior lead-based house paint, as is currently being done under the BSB Lead Intervention Program. Funding and implementing this comprehensive approach requires the voluntary cooperation of the responsible parties (RPs), the county government, and the Agencies.

It is important that the Selected Remedy, if possible, address the non-mining related sources of lead that may not be under the jurisdiction of CERCLA. Interior and exterior leaded paint will re-contaminate indoor households and yards if the lead paint source is not addressed when the home and yard are cleaned of mining related contaminants. If an agreement can be reached between the RPs and the EPA to address lead contamination that is not under the jurisdiction of CERCLA, such as lead-based paint, the Selected Remedy will include a Residential Metals Abatement Program to address lead, mercury, and arsenic contamination in residential settings as described below.

A Residential Metals Abatement Program similar to the current Lead Intervention and Abatement Program being administered by the BSB County Health Department will be required. The Residential Metals Abatement Program will expand the current Lead Intervention and Abatement Program to include arsenic and mercury. The current Lead Intervention and Abatement Program focuses on properties with sensitive populations, such as nursing mothers and children under age 6. The Residential Metals Abatement Program will also provide for a prioritized approach, but is not limited to addressing only properties occupied by sensitive populations. The Residential Metals Abatement Program requires a multi-pathway approach to address arsenic, lead, and mercury in yard soil, indoor dust (living space and direct



exposure to non-living space dust), interior and/or exterior lead paint and lead solder in household drinking water pipes.

Contaminated dust located in portions of homes that are seldom visited (non-living space areas), such as attics or crawl spaces, will be abated if an exposure pathway is identified during sampling and evaluation of the home. If elevated concentrations of heavy metals are found in the attic dust, and there is no avenue for the dust to migrate into the living space, the attic dust will not be removed. Homes where remodeling is planned that would create an exposure pathway to attic dust will be abated. If sampling of living space identifies a pathway of exposure created in other ways, then these homes will also be abated.

Homes in areas that are adjacent to the BPSOU may have contaminated dust in the attics. Homes in areas that are adjacent to the BPSOU that have lead, arsenic, or mercury in attic dust will be addressed in the same manner as homes within the operable unit.

Properties that are not addressed or abated because the owner would not allow access for sampling, or properties with contaminated attics that are not abated because there is no current exposure pathway, or properties that are not currently occupied will be flagged and tracked in the Residential Metals Program database for future action. These properties will be tracked for at least 99 years.

The Residential Metals Abatement Program will require developing and implementing community awareness and educational programs in conjunction with a medical monitoring program.

If the comprehensive program cannot be achieved, the Selected Remedy requires a more rapid assessment and abatement program of all residential areas within the BPSOU site. This program must address mercury, arsenic, and lead sampling for yards and indoor dust attributable in whole or in part to mine waste sources or yard contamination. Residential properties that have sensitive populations may be prioritized for remediation before properties that are occupied by non-sensitive populations, but all known or potential residences must be sampled, assessed, and abated within 3 years of the initiation of the expanded program. Community awareness and educational programs will be implemented. Homes in areas that are adjacent to the BPSOU that have lead, arsenic, or mercury in attic dust will be addressed in the same manner as homes within the operable unit.

**Non-Residential Contamination.** Contaminated solid media located in non-residential areas at the BPSOU site include waste rock piles, smelter wastes, milling wastes, and contaminated soils. Solid media in non-residential areas including commercial areas, open areas, non-active mining areas, etc. may exceed action levels. These areas may also pose a threat to the environment as a result of storm water runoff. For example, runoff from these areas is a source of copper and zinc loading to receiving waters. Contaminated solid media shall be addressed through a combination of source removal, capping, and land reclamation.



Section 12  
Selected Remedy

Reclaimed areas, including cover soil caps, must achieve the performance standards described by EPA in the Butte Reclamation Evaluation System (BRES), which is attached to the ROD as Appendix E. This system is a site-specific tool to evaluate the stability, integrity, and degree of human and environmental protectiveness afforded by EPA-sanctioned response actions, or other past reclamation action initiated on lands impacted by mining within the OU. The information obtained from the evaluation will be used to assure that completed response actions both past and future are effective, are meeting established performance standards and are maintained to protect human health and the environment.

Non-residential sites with contaminated solid media are grouped into different categories for remedial action as follows:

1. **Conditional, Limited No-Further Action Sites.** Areas of the OU that were reclaimed during previous cleanups and that were determined to have met standards and cleanup objectives in the Response Action Summary Document will require periodic assessments of reclamation condition in accordance with the BRES. Corrective action will be taken as dictated by the final Butte Reclamation Evaluation System. Separately, if the Surface Water Management Program determines additional remediation is needed, that work must also be done.
2. **Unreclaimed Source Areas Exceeding Action Levels.** Very few unreclaimed source areas remain with arsenic or lead concentrations greater than human health risk action levels. Areas above actions levels that do remain or are discovered will be capped in a manner similar to prior actions, and will be periodically evaluated and addressed in accordance with the BRES.
3. **Unreclaimed Source Areas Not Exceeding Action Levels.** If an unreclaimed, disturbed site does not exceed lead or arsenic action levels, it may still be reclaimed because of contributions to storm water contamination. EPA, in consultation with the State, has determined that the sites listed in Section 12.3.1.2, at a minimum, will be addressed as an initial BMP effort under the Selected Remedy. If it is demonstrated by the surface water monitoring and BMP program that contaminants of concern (i.e., copper and zinc) from other areas are migrating and impacting surface water quality in Silver Bow Creek, Blacktail Creek, or Grove Gulch Creek, to the extent that applicable water quality standards are exceeded, remedial actions will be implemented. The action to be implemented will be determined during remedial design, but will likely be capping with limited removal and reclamation. Reclamation condition will be periodically assessed in accordance with the BRES.
4. **Previously Reclaimed Sites (Not Addressed Under EPA Order).** Sites where reclamation took place outside of removal actions mandated or performed by EPA will require sampling/inspection and possible further reclamation, as necessary. Specific actions to be implemented will be determined during remedial design, but will likely be capping with limited removal. These sites shall also be evaluated



and maintained over the long-term under the Butte Reclamation Evaluation System.

5. **Granite Mountain Memorial Area.** Various reclamation and other enhancements to the historic Granite Mountain Memorial Area shall be implemented. These include: reclaiming source areas in publicly used areas, restricting access to certain areas of the historic mining landscape, installing picnic areas and walking trails, enhancing existing vegetation, and diverting storm water runoff to the Berkeley Pit. These actions shall be consistent with historical preservation requirements and other standards and the county's historical park plan.
6. **Syndicate Pit.** The Syndicate Pit shall be reclaimed, to the extent practicable, for use as a mine training center. Shallow to moderate slopes will be reclaimed using soil caps, rock caps, and gravel parking areas. Steep slopes will not be reclaimed. The pit base will continue to be used as a sediment catch basin.
7. **Butte Mine Waste Repository.** The existing Butte Mine Waste Repository will be closed in compliance with ARARs. A new repository will be sited next to the existing repository if that capacity is needed. It, too, would be closed using the same standards.
8. **Sites Not Granted "Conditional, Limited No Further Action" Status.** Areas of the OU that have been reclaimed during previous TCRAs or N-TCRAs and that were determined NOT to meet ARARs and preliminary remedial action objectives (RAOs) in the Response Action Summary Document were the Colorado Smelter, Lower Railroad Yard Site 1, and Lower Area One. The Selected Remedy Components for the Colorado Smelter and the Lower Railroad Yard Site 1 are discussed in Section 12.3.1.2. The Selected Remedy for the Lower Area One site is described with the Groundwater Components.
9. **Buried and/or saturated solid media in Lower Area One and Metro Storm Drain.** The Selected Remedy for Lower Area One and Metro Storm Drain is described in the Groundwater portion of the text.

### 12.1.2 Groundwater

The Selected Remedy for groundwater includes the following components:

1. **Waste Left in Place.** Areas of waste and contaminated, saturated soils will be left in place in LAO and MSD. To reduce the loading of metals to groundwater in the area overlying the Parrott Tailings (e.g., the ball fields and BSB County Shops), infiltration barriers shall be considered during remedial design and implemented if determined to be appropriate by EPA, in consultation with DEQ. The sedimentation basin/former wetland demonstration project area near the intersection of Kaw Avenue and George Street shall also be reclaimed according to the intended future land use, and may be used as a potential storm water retention/detention basin under the Surface Water Management Program.



*Section 12*  
*Selected Remedy*

2. **Groundwater Capture and Treatment – MSD Area.** Contaminated alluvial groundwater in the MSD shall be captured with the subdrain under the MSD channel, and/or another appropriate groundwater collection system as determined under remedial design. The captured groundwater shall continue to be pumped from the terminal vault in the MSD to the treatment facility at LAO. The captured and pumped water will be treated by lime precipitation technology as described below in subparagraph 4 before being discharged to Silver Bow Creek. However, because issues regarding long-term performance of the subdrain have not been fully addressed to date, the Selected Remedy also includes a 5-year shakedown period to evaluate the reliability of the MSD subdrain collection system. During this shakedown period, an approved operation and maintenance plan shall be developed for the collection system. If during the shakedown period, monitoring data demonstrate that the subdrain is not effectively collecting contaminated groundwater, or is spreading contamination downgradient, a new or modified groundwater collection system will be designed and built.
3. **Groundwater Capture and Treatment – LAO.** Contaminated alluvial groundwater at LAO and base flow from Missoula Gulch shall be intercepted in a hydraulic control channel, which runs parallel to Silver Bow Creek, and routed to the treatment lagoon facility described below. If groundwater inflow between the MSD and LAO capture systems (i.e., between the end of the MSD subdrain and the start of the hydraulic control channel) is found to adversely affect surface water quality, additional groundwater capture and hydraulic control systems shall be implemented. In addition, water from the Mine Flooding OU West Camp System will be routed to the hydraulic control channel at Lower Area One for treatment through the treatment facility described below.
4. **Groundwater Treatment Facility.** As part of the RI/FS, Atlantic Richfield has constructed a lagoon treatment system at Lower Area One as a demonstration project. Treatment discharge data suggest that the system has been meeting state water quality standards for copper, cadmium, and zinc at the point of discharge arsenic standards have been met on all but a few occasions. These data are especially encouraging for cadmium discharges – conventional treatment systems have had problems meeting the cadmium standard because of reduced holding times in such facilities. The lagoon treatment system's longer holding times appear to be effective in the treatment of cadmium. Accordingly, the Selected Remedy includes retention and continued operation of the lagoon system for treating captured and routed groundwater prior to discharge to Silver Bow Creek. However, because issues regarding long-term performance and sludge removal and disposal have not been fully addressed to date, the Selected Remedy also includes the following:
  - a. A 5-year shakedown period will be in place for the lagoon treatment system. The captured groundwater will be treated to DEQ-7 standards (Table 8-2) prior to discharge. The lagoon treatment system must demonstrate successful water treatment and full compliance with the standards, when operating at designed capacity, and when operating



under a wide range of conditions. Also, it must be demonstrated that sludge removal and sludge management can be performed effectively without causing system upsets. AR made modifications to expand the capacity of the treatment lagoons that did not go through the formal EPA design, review, and approval process. Therefore, those modifications and any additional design of the expanded treatment lagoon system will need to go through the formal EPA review and approval process. The lagoon treatment system shall be designed to prevent the release of untreated contaminated waters into Silver Bow Creek, as a result of upset periods due to flooding, equipment malfunction or failure, or extended periods of cold, etc. ARAR compliant sludge removal, management, and disposal plans must be developed and approved.

- b. Using the Butte Reduction Works area, near the lagoon treatment system, for sludge drying and sludge management is not allowed, since it is a dedicated open space area more suitable for public use.
  - c. If at any time during the shakedown period, or thereafter, the system fails to meet discharge standards and cannot be adjusted or modified to meet standards, or if sludge removal, management, and disposal cannot be done in compliance with ARARs and in a protective manner, a conventional lime treatment system shall be designed and built at Lower Area One. The conventional system shall use lime treatment technology to treat the captured contaminated water and meet all discharge standards.
  - d. To prevent the discharge of untreated water into Silver Bow Creek, the design will be required to include contingencies for how to manage and store collected groundwater during extended periods of upset (e.g., flooding, equipment malfunction or failure, extended periods of freezing, etc.)
5. **Groundwater Monitoring.** A comprehensive groundwater monitoring plan shall be prepared and implemented for the entire alluvial aquifer to ensure that groundwater capture systems are effective; to determine that contaminated groundwater is not leaving the TI Zone or discharging to surface water; to provide additional information as necessary on the movement, quality, and quantity groundwater; and to provide data for review of the groundwater remedy. The groundwater monitoring program will include installing additional monitoring wells, regular measurement of water quality and water levels in a monitoring network, and shall provide thorough monitoring that includes, but is not limited to, groundwater in upper and lower MSD, groundwater near the southern extent of the TI zone, between the MSD and LAO groundwater capture systems, and in the area adjacent to, and downgradient of the lagoon treatment system. An initial outline of groundwater monitoring requirements is included in Section 12.3.2.3.
6. **Controlled Groundwater Area.** A controlled groundwater area shall be established for the alluvial aquifer to prevent domestic use of this water and to



*Section 12*  
*Selected Remedy*

prevent any well development that would exacerbate or spread existing contamination. Other institutional controls, such as county laws or regulations regarding domestic use of groundwater in the area, may also be required.

The Selected Remedy for groundwater will be implemented primarily in the Metro Storm Drain and Lower Area One areas. Under the Selected Remedy, buried and partially saturated wastes in these areas will be left in place with appropriate groundwater monitoring and institutional controls. This will provide a continued understanding of the extent of groundwater contamination and long-term protection of human health and surface water resources.

Contaminated alluvial groundwater in the MSD will be captured and routed to a lime treatment facility for treatment and discharge to Silver Bow Creek, per the conditions described above. The groundwater collection system at MSD and LAO has and will significantly reduce the loading of metals to Silver Bow Creek. The groundwater remedy will provide the level of protection of Silver Bow Creek needed to achieve remedial action objectives during non-wet weather (base flow) conditions.

Although previous response actions have removed a substantial quantity of waste material from LAO, wastes remain beneath the Municipal Sewage Treatment Plant, structures such as the aqueduct and slag walls being retained for their historic value, and below the vertical excavation limits established during the design of LAO ERA. Existing hydraulic controls constructed during the LAO cleanup to capture, control, and extract contaminated alluvial groundwater and to prevent groundwater discharge to Silver Bow Creek are incorporated into the Selected Remedy. This system has operated since 1998 and, based on improvements in water quality in Silver Bow Creek, appears to be effectively capturing contaminated alluvial groundwater.

Under the Selected Remedy, groundwater captured in the interception and collection systems at LAO and MSD will be combined with contaminated base flow from Missoula Gulch and the groundwater from the West Camp bedrock system of the Mine Flooding OU for combined treatment in the treatment lagoon facility, to be evaluated and possibly re-designed or modified during remedial design (per the conditions described above). If monitoring data demonstrate that the current subdrain is not capturing the contaminated groundwater, or contaminated groundwater is leaving the site, or the system is not otherwise effective, additional groundwater capture systems and/or extraction wells will be implemented to ensure full effectiveness of the system. The treated water shall be subsequently discharged to Silver Bow Creek or used for other beneficial purposes. Treatment capacity for the treatment lagoon system will be evaluated and finalized during remedial design. Groundwater quality ARARs are waived as described in Section 12.3.2 and Appendix A - ARARs.

### **12.1.3 Surface Water**

The Selected Remedy for surface water is directed at achieving the primary objectives of returning Silver Bow Creek to its beneficial uses and protecting downstream receptors from releases of contamination from BPSOU. The Selected Remedy will



protect human health and the environment, achieve water quality standards for COCs in Grove Gulch, Blacktail Creek and Silver Bow Creek, and meet all ARARs that are not waived. The Selected Remedy for surface water consists of the following components:

1. The Surface Water Management Program, which utilizes BMPs to address contaminated storm water runoff and improve storm water quality.
2. Excavation and removal to a repository of contaminated sediments from the stream bed, banks, and adjacent floodplain along Blacktail Creek and Silver Bow Creek, from just above the confluence of Blacktail Creek and Metro Storm Drain to the beginning of the reconstructed Silver Bow Creek floodplain at Lower Area One. Following removal of the in-stream sediments, further evaluation of surface water quality in this area will be conducted. If groundwater inflow is found to adversely affect surface water quality, additional hydraulic controls and groundwater capture shall be implemented.
3. Capturing and treating storm water runoff up to a specified maximum storm event, if BMPs implemented under the Surface Water Management Program do not achieve the goal of meeting surface water standards in Silver Bow Creek, Grove Gulch, and Blacktail Creek during storm water events.
4. Hydraulic control, capture, and treatment of contaminated groundwater to prevent its discharge to Silver Bow Creek surface water (as described above and in Section 12.3.2).
5. In-stream flow augmentation as appropriate. Flow augmentation will not be considered until the major remedial components described in this ROD are designed and implemented.

Hydraulic control, capture, and treatment of contaminated groundwater have largely addressed surface water contamination during base flow conditions. The additional removal actions described above will continue this process. Storm water BMPs will be used to control storm water runoff from the OU and reduce the level of contamination of Silver Bow Creek, Blacktail Creek, and Grove Gulch from heavy metals and arsenic to below state water quality standards. The BMPs that will be implemented include, but are not limited to, actions such as source controls including waste removal, engineered sediment controls, curb and gutters, subsurface drains, detention/retention basins, and routing storm flows away from receiving waters. If surface water quality standards cannot be met in Silver Bow Creek, Grove Gulch, or Blacktail Creek, lime treatment of storm water runoff may be required. Under this contingency, storm flows up to a specific design criterion would be collected and treated by lime treatment or redirected to the Berkeley Pit. If treatment is required, a conventional lime treatment plant dedicated for that purpose would be constructed.

The Selected Remedy permits augmenting stream flows by adding other water sources if necessary to increase flows and improve water quality. The objective of



*Section 12*  
*Selected Remedy*

augmentation is to enhance the performance of other components of the surface water remedy and increase the probability of meeting surface water standards on a consistent basis within Silver Bow Creek.

Elevated levels of arsenic and heavy metals occur in streambed sediments, the stream banks, and nearby floodplain materials from the confluence Metro Storm Drain and Blacktail Creek to the reconstructed Silver Bow Creek channel at Lower Area One. To prevent these materials from being a source of contaminants to Silver Bow Creek, these materials shall be excavated and removed to an appropriate mine waste repository. The stream channel and floodplain shall then be reconstructed to meet engineering and performance standards.

#### **12.1.4 Institutional Controls**

The Selected Remedy includes the following minimum ICs:

1. A controlled groundwater area will be established in the Alluvial Aquifer TI Zone to prevent domestic use of contaminated water, exacerbation or spreading of existing contamination, or release of highly contaminated groundwater to surface water resources through irrigation. The controlled groundwater area will prevent new well development, except for CERCLA monitoring wells, well systems that treat contaminated water prior to use, and the use of existing domestic and commercial wells. To the extent a controlled groundwater area will not prevent the use of existing wells, an education and well abandonment program will be implemented to persuade owners not to use contaminated water and to voluntarily take existing wells out of service in exchange, for example, for being hooked up to public water. An administrative entity will be identified under RD/RA to monitor and enforce these restrictions.
2. County zoning and permit requirements will be implemented to ensure that capped waste areas, discrete areas of waste left in place, and other control measures such as storm water controls are not disturbed, mismanaged, or inappropriately developed and that waste taken from these areas is disposed of at the Butte Mine Waste Repository, or if identified as a hazardous waste disposed of at a RCRA C facility. These controls and permits are best implemented with adequate funding for appropriate redevelopment and re-use of affected sites.
3. Deed notices will be required for all areas where wastes were capped and left in place or where engineered controls were constructed or other discrete wastes were left in place. The deed notices will notify current and subsequent landowners of the presence of these wastes or engineered controls and ensure that these wastes are not disturbed. In addition, fencing and signs may be required to ensure the integrity of caps and engineered controls.
4. Where private landowners require fencing or use posting for legitimate reasons relating to the prevention of remedy disruption, the Selected Remedy requires the installation of these fences or signs.



Item 2 above is likely to be implemented by Butte Silver Bow County.

EPA will work with the county and responsible parties to ensure that workable and adequate zoning controls and permit requirements are enacted and enforced. This will require funding for the county, and the funding issue will have to be addressed in any enforcement action for this ROD. Item 1 above has been developed by the local water district with funding from the responsible parties, and efforts to finalize and submit the application for a controlled groundwater area to the State Department of Natural Resources, and enforcement of the ban once enacted, will require additional funding. Item 3 above is an issue that responsible parties and Butte Silver Bow County will need to work on cooperatively with all affected landowners. Fences and signs are actions that can be taken by the responsible parties which implement the remedy, again in cooperation with local landowners.

### **12.1.5 Operations and Maintenance**

There are several short-term Operation and Maintenance (O&M) plans in existence for various actions within the BPSOU site. The Selected Remedy requires the development of long-term and integrated comprehensive monitoring and O&M plans for all aspects of the Selected Remedy.

### **12.1.6 Section Organization**

The remainder of this section describes the Selected Remedy in detail in accordance with the following subsections:

- Section 12.2: Rationale for the Selected Remedy
- Section 12.3: Detailed Description of the Selected Remedy by Media
- Section 12.4: Estimated Cost of Selected Remedy
- Section 12.5: Expected Outcomes of the Selected Remedy
- Section 12.6: Performance Standards

## **12.2 Rationale for the Selected Remedy**

The Selected Remedy provides the best balance of tradeoffs among media-specific alternatives, and attains an equal or higher level of achievement of the threshold and balancing criteria than other site-wide alternatives that were evaluated. The Selected Remedy achieves substantial risk reduction and is feasible, implementable, and cost-effective. Residual risks are effectively eliminated, mitigated, or managed under the Selected Remedy. The successful performance of the Selected Remedy is demonstrated by several years of reclamation performance monitoring at response action sites in the OU, experience with groundwater and storm water controls, and the success of the Lead Intervention and Abatement Program. Further, the Selected Remedy is compatible with land reuse and redevelopment within Butte and



Section 12  
Selected Remedy

Walkerville, and EPA and the State will continue to work cooperatively with the local county government and the RP Group to continue redevelopment efforts. Further rationale for the Selected Remedy is provided below with respect to the media of concern (solid media, groundwater, and surface water).

***Solid Media***

The Selected Remedy for solid media includes a variety of components that together represent an effective and practical remedial solution for the type of waste and the associated level of risk at the BPSOU. The site has a high volume of relatively low toxicity mining-related waste within the OU. As discussed in Section 11, the mining-related wastes still remaining in the BPSOU do not constitute a “principal threat,” meaning that the level of hazard and risk is relatively low and contamination associated with the wastes can be reliably contained. Further, the absence of principal threat wastes reduces the need and expectation for treatment of wastes. Considering the low level of risk associated with mining wastes, complete (total) removal of all contaminated solid media within the urban area of Butte is not practical, nor is it feasible considering the ubiquitous nature of the wastes, the degree of disruption to the community, and the costs associated with such a large scale removal. The components of the Selected Remedy for solid media accomplish overall protection of human health and the environment and compliance with ARARs or appropriate ARAR waivers equally as well or better than other alternatives evaluated<sup>5</sup>. Threshold criteria are achieved through removal and/or capping of contaminated mine wastes, residential yard removals, and abatement of residential metal sources that exceed established risk-based action levels and have a demonstrated pathway of exposure. Also, source controls for solid media (capping, removal, reclamation) will be used to prevent contaminants from entering surface water that would result in exceedances of water quality standards. Although complete or total removal of all wastes would provide a high level of long-term protection, the benefits of a total removal in Butte would be offset by high short-term risks associated with a removal of this magnitude. The Selected Remedy effectively eliminates, mitigates, or manages risk and provides for long-term protection through source controls, proactive community education and medical monitoring program, residential contamination abatement, and continuous evaluation and performance monitoring of the remedy with the Butte Reclamation Evaluation System.

***Groundwater***

Under the Selected Remedy, contaminated groundwater is captured and pumped to a treatment facility prior to being discharged to Silver Bow Creek or used for other beneficial purposes. Institutional controls in the form of controlled groundwater areas will regulate the use of alluvial groundwater and prohibit human exposure to groundwater contaminants. The Selected Remedy will not directly remediate the

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<sup>5</sup> See footnote 3 on page D-12 for an explanation of how the waiver of groundwater ARARs also applies to possible floodplain or solid waste ARARs which may apply to waste left in place in current floodplains.



alluvial aquifer and a waiver of groundwater ARARs is appropriate<sup>6</sup>, as discussed in Section 12.3.2. Extensive analysis of the chemistry and hydrogeology of the alluvial aquifer has demonstrated that active remediation of the alluvial groundwater is not technically practicable and cannot return the aquifer to its beneficial uses (e.g., comply with ARARs) within a reasonable time frame (100 years). The components of the Selected Remedy for groundwater accomplish overall protection of human health and the environment equally as well or better than other alternatives evaluated. Protection is achieved through capturing and treating of contaminated groundwater to prevent discharges to Silver Bow Creek in excess of standards, monitoring contaminant plumes within the TI waiver zone and containment if necessary to prevent the plumes from leaving the TI zone, and implementation of institutional controls to prohibit human contact with contaminated groundwater. Large-scale removal of source materials was carefully evaluated but when compared with the Selected Remedy was found to be significantly more costly and less effective over the short-term. Large-scale removal would also present significant risks to workers and the Butte citizenry, and cause unacceptable socio-economic impacts to the community. Also, despite removal of source material, residual contaminants in the alluvial aquifer and groundwater would persist for an unreasonable period of time at levels above groundwater ARARs. Finally, regardless of the scale of any potential removal, groundwater capture and treatment would still be required over the long-term to control the release of residual contaminants.

#### *Surface Water*

The Selected Remedy protects human health and the environment and achieves compliance with ARARs for surface water. In addition to the hydraulic control, capture, and treatment of contaminated groundwater, protection is achieved through removing source materials from the Silver Bow Creek floodplain, channel reconstruction, removing contaminated sediment and stream bank material, and implementing BMPs. The Selected Remedy calls for an aggressive storm water monitoring and BMP program to reduce contaminant loading to surface water and meet surface water quality standards during wet-weather flow conditions (snow-melt and precipitation runoff). If ARAR compliance is not achieved through implementing storm water BMPs, contaminated storm water will be captured and treated to achieve ARARs.

Due to the severe impacts to Silver Bow Creek water quality observed early on in the RI/FS process, EPA implemented response actions to address surface water contamination issues (Lower Area One N-TCRA, Storm Water TCRA, source area removals on the Butte Hill, and collecting and rerouting groundwater in the Metro Storm Drain). As a result, many protective actions for surface water have been implemented and base flow water quality is greatly improved. Remedial approaches

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<sup>6</sup> See footnote 3 on page D-12 for an explanation of how the waiver of groundwater ARARs also applies to possible floodplain or solid waste ARARs which may apply to waste left in place in current floodplains.



Section 12  
Selected Remedy

available to address the remaining sources of surface water contamination at the BPSOU are limited, and as a result, components of the Selected Remedy that remain to be implemented for surface water (source controls, sediment removal, and surface water management and BMP program) were common among all the active remedial alternatives evaluated for the BPSOU (site-wide alternatives 2-6). Thus, the Selected Remedy attains an equal or higher level of achievement of the threshold and balancing criteria for surface water than other site-wide alternatives that were evaluated.

Overall, the Selected Remedy for the BPSOU meets the requirements of CERLCA and the NCP by effectively removing or addressing the principal contaminant sources in solid media, groundwater, and surface water such that human and environmental receptors are protected and ARARs are achieved over the long term or appropriately waived.

## **12.3 Detailed Description of the Selected Remedy**

The Selected Remedy is described in detail in the sections that follow. Details of the Selected Remedy may be modified somewhat as a result of the remedial design and construction processes. Design changes will be documented.

### **12.3.1 Selected Remedy for Solid Media**

The Selected Remedy addresses residential and non-residential contaminated solid media in the form of mining-related wastes, contaminated soils, and interior residential dust (including both living space and attic dust). The Residential Metals Abatement Program is an important component of the remedy for solid media that addresses overall human exposure to arsenic, lead and mercury within the residential environment. The Residential Metals Abatement Program combines site-wide sampling and remediation of all residential properties that exceed the action levels for arsenic, lead and mercury. The program continues a multi-pathway approach that prioritizes sensitive populations within the community to address potentially harmful exposures to residential metals contained in yard soil, interior living space dust, attic dust, and non-mining related sources (lead paint, lead solder) within the residential environment. In addition to the prioritized approach, the Selected Remedy includes a component to methodically sample and remediate all properties that exceed action levels.

The Selected Remedy for solid media is discussed below in two categories, residential and non-residential contamination.

#### **12.3.1.1 BPSOU Residential Metals Abatement Program**

The Selected Remedy for residential contamination implements the BPSOU Residential Metals Abatement Program, which uses a multi-pathway approach for mitigating residential exposures. The program is designed to mitigate harmful exposure of BPSOU residents to lead, arsenic, and mercury from both mining-related (waste-rock, tailings, aerial emissions) and non-mining sources (lead paint and lead solder). The potential sources of lead, arsenic, and/or mercury exposure that will be



addressed include yard soil, interior living space dust, interior and/or exterior lead based paint, lead in drinking water from pipe solder, and non-living space dust when exposure pathways are identified. In addition, the program uses community awareness and education in conjunction with medical monitoring to target affected and sensitive individuals and prioritizes sampling and remediation in locations where these people live. Although the Residential Metals Abatement Program will utilize this prioritized approach, the program is not limited to addressing only properties occupied by sensitive populations. The Residential Metals Abatement Program requires a multi-pathway approach to address both mining and non-mining-related contamination at all residential properties within the BPSOU. Affected populations are those determined through medical monitoring to have elevated levels of lead or mercury in blood samples or elevated arsenic in urine samples. Sensitive populations include young children and pregnant or nursing mothers.

Human health risk assessments at the BPSOU quantified potential risks to human receptors within residential settings due to chronic exposure to arsenic, lead, and mercury contained in yard soil, interior living space dust, non-living space (attic) dust, interior air (mercury only) and to non-mining-related contaminants such as lead in paint and water supply pipe solder. As a result, action levels were established for arsenic, lead, and mercury in residential yard soil and interior dust, and for mercury vapor in indoor air. Residential action levels are described above in Table 12-1.

Within the BPSOU, there are many pathways that expose people to metals and arsenic originating from mining activities, including ingestion of and dermal contact with soil, mine wastes, dust, surface water and sediment; ingestion of soil or garden-grown food; and inhalation of particulates (dust). Butte residents may also be exposed to lead from non-mining sources in and around their homes, such as lead-based paint, and water in contact with lead solder in water supply pipes. When multiple, interrelated sources may be present, the relative importance of the various potential sources of arsenic, lead, or mercury exposure with respect to their impact on personal health is difficult to identify with any degree of certainty. For this reason, the Selected Remedy uses a multi-pathway approach for identifying and addressing residential exposures to arsenic, lead, and mercury from the various potential sources. The multi-pathway approach is intended to mitigate lead, arsenic, and/or mercury exposures from both mining-related and non-mining-related sources in residential settings. The BPSOU Residential Metals Abatement Program requires that all residential properties throughout the BPSOU be systematically sampled. Sampling will include residential yard soil, interior living space dust, non-living-space dust, and lead-based paint. Those properties with yard soil or interior living space dust exceeding solid media action levels, or indoor air exceeding the mercury vapor RG, will be remediated. Also, in homes where there is plumbing that may contain lead pipes and/or lead solder, water samples will be collected and analyzed for lead.

The Selected Remedy requires that all residential properties be sampled, assessed, and abated within 15 years. A complete indoor and outdoor assessment (i.e., residential yard soil, indoor and outdoor dust, non-living space dust, lead-based paint, drinking water, and mercury vapor) of all residential properties that are known



*Section 12*  
*Selected Remedy*

to be occupied or expected to be occupied must be completed within the first 8 years of the initiation of the expanded program. During this 8-year period, the clean-up of residential properties that exceed the action levels will occur in concert with the assessment program. The Selected Remedy also requires a long-term assessment and abatement program to address O&M issues and to administer the attic dust component of the residential metals program. Since attic dust will not be cleaned-up unless there is an established pathway of exposure as explained elsewhere in this document, there will be a long-term requirement to assess and abate attic dust problems as they surface. Following the completion of the Consent Decree, a detailed Residential Metals Abatement Work Plan must be prepared to describe the scope and administration of the Residential Metals Abatement Program in accordance with the Record of Decision.

There are approximately 4,400 total residential properties within the BPSOU boundaries. The RI Report (PRP Group 2002) indicated that 660 residential yards had been sampled as of December 31, 2000 under the Butte Lead Intervention and Abatement Program. This indicates that there are at least 3,740 residential properties remaining in the BPSOU to be sampled. This ROD requires that all residential properties be assessed within 8 years. Thus, at least 468 residential properties will be sampled annually until the untargeted sampling program is completed. Further, information presented in Appendix F-3 of the FS Report (PRP Group 2004) indicates that on average, 44 percent of the properties sampled in the past have exceeded one or more of the solid media action levels. Assuming that this ratio of properties exceeding action levels continues, an estimated 1,408 residential properties will require remediation. This number of properties is expected to be higher than will actually be required, because recent activities have focused on Walkerville and portions of Butte where historical mining activities were more intensive and where lead, arsenic and mercury levels in soils would be expected to be higher than in other residential portions of the BPSOU, such as the area closer to Interstate 90, which will likely have lower contaminant concentrations. At least 94 properties per year will need to be addressed to complete the remediation of all residential properties within the required 15 years.

According to BSB, 59 percent of properties that have required residential soil abatements have also needed house abatements, resulting in an estimated 831 homes that may require remediation. Using this estimate, about 56 house abatements will need to be conducted per year to complete remediation within the required 15 years.

The Residential Metals Abatement Program will be a point of focus during the five year review process to determine if changes need to be made to improve the program.

The Selected Remedy requires a long-term tracking and database program to ensure that properties that were not occupied or the owner refused access during the assessment period will be abated in the future if necessary. In addition, the tracking program will follow changes in ownership and remodeling of homes that were found to have contaminated attic dust but no current pathway. The long-term tracking program will be continued for at least 99 years.



If the comprehensive program cannot be achieved, the Selected Remedy requires a more rapid assessment and abatement program of all residential areas within the BPSOU site. This program must address mercury, arsenic, and lead sampling for yards and indoor dust attributable in whole or in part to mine waste sources or yard contamination. Residential properties that have sensitive populations may be prioritized for remediation before properties that are occupied by non-sensitive populations, but all known or potential residences must be addressed within 3 years of the initiation of the expanded program.

#### *Non-Living Space (Attic) Dust*

The possible presence of lead, arsenic, and mercury in portions of a residence that are seldom, if ever, visited (e.g., attics) will be addressed under the BPSOU Residential Metals Abatement Program through an education and awareness program, with dust removal conducted only if an exposure pathway is identified. The program will ensure that all interior living spaces, including rentals, will be inspected to determine that attic dust is not entering living spaces. This program will also address homes that are in areas adjacent to the boundary of BPSOU. Aerial emissions from the mining activities located within the BPSOU may have contaminated attics in areas adjacent to BPSOU. Homes in areas that are adjacent to the BPSOU that have lead, arsenic, or mercury in attic dust will be addressed in the same manner as homes within the operable unit.

Non-living space dust does not present a risk to occupants of the home as long as it is contained within areas of the home that are not regularly accessed. An exposure pathway is identified through the sampling of interior dust or if the residents begin remodeling activities that could release contaminated dust into the living space of the residence. If elevated concentrations of heavy metals are found in the attic dust, and there is no avenue for the dust to migrate into the living space, the attic dust will not be removed. Non-living space dust will be sampled along with yard soil and living space dust whenever residential sampling is conducted under the BPSOU Residential Metals Abatement Program. The "attic dust" component of the multi-pathway program will rely on educational materials to make the home owners aware of the presence of lead, arsenic, and/or mercury in the specific, seldom-accessed portions of their homes (e.g., the attic) and understand the importance of taking special precautions when accessing those areas. In addition, the program will provide dust control and removal services as requested by home owners planning a remodeling effort that could cause dust in the seldom-accessed living areas to be released to the regularly used portions of the home. Trained and certified professionals will perform all remedial action clean-ups under the multi-pathway portion of the BPSOU Residential Metals Abatement Program.

The regulatory agencies will evaluate the residential abatement program in 18 months, 36 months, and 5 years after the initiation of the expanded program. If these reviews show that the program is not protective of human health, the Agencies will modify the criteria that trigger the abatement of sources of attic dust contamination.



Section 12  
Selected Remedy

If a Residential Metals Abatement Program cannot be achieved, the attic dust program described here shall be incorporated into the rapid assessment and abatement program described previously.

*Community Awareness and Education*

An extensive community awareness and education program to manage lead, arsenic, and/or mercury exposure within the BPSOU will be an integral part of the BPSOU Residential Metals Abatement Program. The focus of the community awareness program will be to raise general public awareness of potential risks from these metals, especially risks to young children from lead exposure, and to encourage participation in the program. The Center for Disease Control (CDC) states that education is critical to the success of any metals intervention and abatement program.

The proposed multi-pathway program will include a range of education programs to enhance and maintain the community's awareness of potential sources and exposure risks to lead, arsenic, and/or mercury in and around homes, as well as approaches residents can take to avoid exposures. The program would include advertising and outreach programs, periodic mailings to property owners and residents within the BPSOU, and distributing free educational materials to various target groups.

The education and outreach program would specifically address portions of homes that are seldom, if ever, visited (i.e., non-living space areas). Addressing non-living space portions of a residence through education and outreach, with dust removal only occurring in conjunction with remodeling or other activities that create an exposure pathway, is based on the findings of the human health risk assessment completed in Walkerville (UOS 2003). The program would rely on educational materials to ensure that home owners, remodeling contractors, and weatherization workers are: (1) aware of the potential presence of lead, arsenic, and/or mercury in the seldom-accessed portions of their homes, (2) understand the importance of restricting access to those areas by sensitive populations and taking measures to avoid tracking dust from those areas into the interior living space when infrequent access occurs, and (3) provided with the proper contact information prior to implementing any remodeling efforts to ensure that dusts and soil are appropriately handled and disposed of by a responsible entity and/or by approved contractors. The educational materials would be provided at the time any remediation of the home is implemented (whether interior or exterior) as well as when building permits are sought for remodeling projects. In addition, education will be provided to all participants in the program, including individual face-to-face consultations with residents and customized recommendations for specific actions that will reduce the residents' risk associated with metals exposures. The recommendations made to each resident will be based on the results of environmental sampling at their homes and specific information collected by the program about their daily habits and activities.

The education and outreach program should target remodeling contractors and weatherization workers as they may be exposed to many attics. The weatherization program is coordinating with the Butte-Silver Bow County Health Department to



assure that contaminated attic dust is not disturbed or tracked into living spaces or inappropriately covered by insulation.

### ***Medical Monitoring***

The Residential Metals Abatement Program or residential abatement efforts will include medical monitoring. Participation in the medical monitoring will be encouraged through community awareness and education. Medical monitoring will use blood lead, blood mercury, and urinary arsenic data to identify individuals who have concentrations of those elements above risk-based thresholds. When individuals are found to have elevated blood lead, blood mercury, or urinary arsenic, the home where the affected person or persons live will be scheduled for immediate sampling and evaluation. Residential remediation will be performed if sampling determines that yard soil, interior living-space dust, or mercury vapor action levels are exceeded. Residential properties would be prioritized for remediation based on the following criteria, arranged from highest priority to lowest priority level:

- Homes occupied by one or more children with a blood lead equal to or greater than 10 µg/dL (which is considered to be an elevated blood lead).
- Homes occupied by an individual with elevated urinary arsenic.
- Homes occupied by an individual with elevated blood mercury.
- Secondary residences or subsequent homes occupied by children with elevated blood lead.
- Homes previously occupied by children with elevated blood lead, even if no child is currently living at the address.
- Homes with very young children (e.g. <1 year) and blood lead of 5-9 µg/dL.
- Homes with no children, but with one or more sources (paint, water, soil, house dust) with a lead concentration that exceeds the 95th percentile as determined by the Butte-Silver Bow (BSB) Environmental Health Lead Study (University of Cincinnati, 1992). Particular attention should be given to homes built prior to 1940.
- Designated playgrounds.
- Informal play areas frequented by children with or without property owner's permission.
- All other actual or potential residential areas.

### ***Residential Remediation***

In summary, residential properties will be remediated if sampling data indicate that action levels for yard soil or interior living space dust are exceeded, or for indoor air when mercury concentrations exceed the mercury vapor RG. Residential remediation will involve removing and replacing the yard and a thorough one-time house



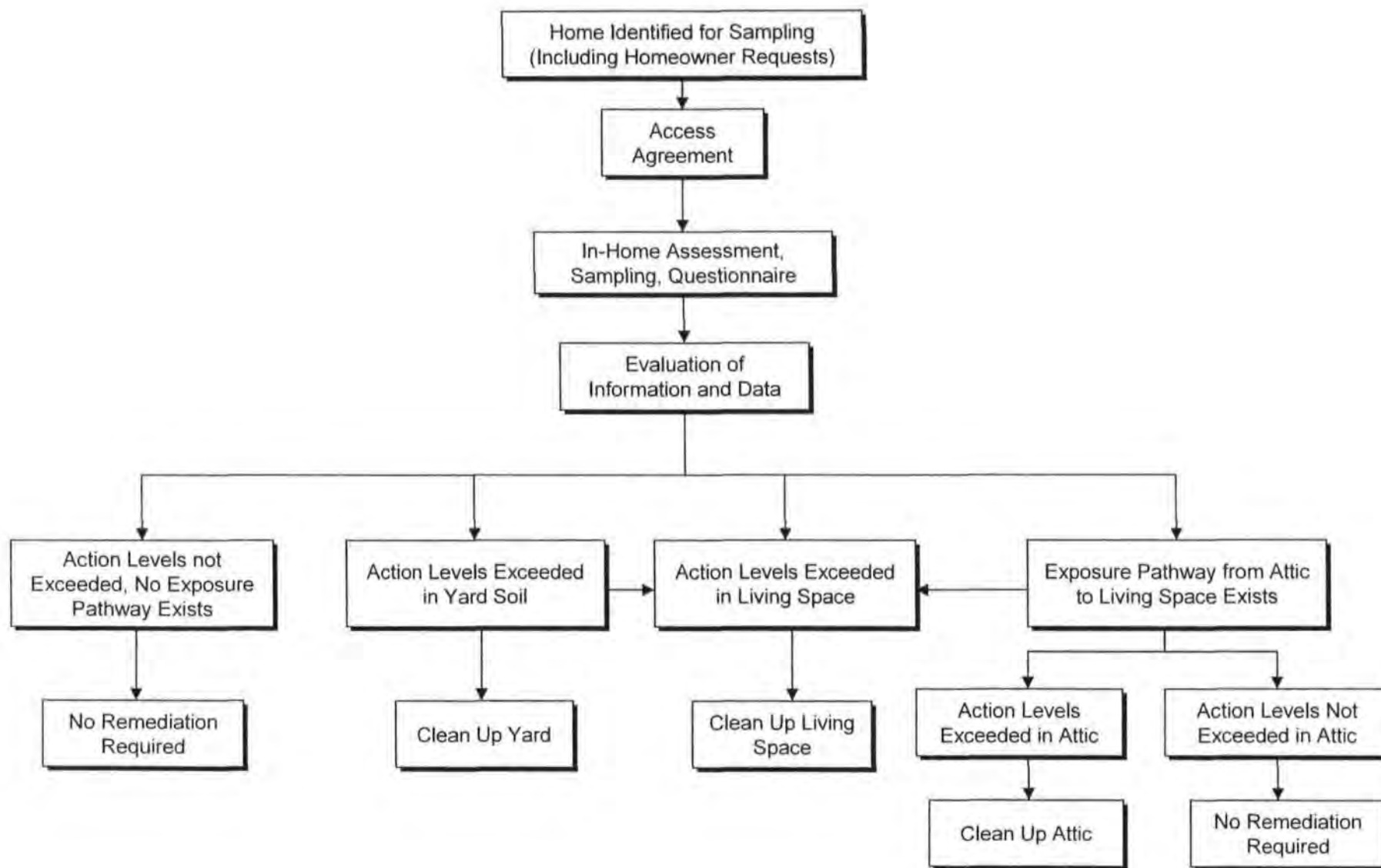
*Section 12*  
*Selected Remedy*

cleaning to mitigate the RG exceedances inside. If an exposure pathway is identified by sampling interior dust or if the residents begin remodeling activities that could release contaminated dust into the living space of the residence, the attic dust will be cleaned up by trained and certified professionals. EPA will work with all parties to see that this effort is accomplished under a Residential Metals Abatement Program. Yard removal and replacement will only be performed if samples of yard soil exceed action levels. House cleaning will be performed if outdoor soil, interior dust, and/or mercury vapor action levels are exceeded. Remediation of houses may include interior painting, exterior painting, and/or installation of siding if lead paint is found. If lead exists in the home's plumbing system that results in elevated concentrations of lead in the drinking water, the plumbing system will be modified or replaced. The decision-making process for remediation of residential properties is summarized in Figure 12-1.

Residential soil sampling, removal, and replacement will be implemented in accordance with an EPA-approved work plan such as a Residential Metals Abatement Program Work Plan and Sampling and Analysis Plan (WP/SAP). If agreement on a comprehensive program is reached, this WP/SAP will be consistent with the existing Butte-Silver Bow Lead Intervention and Abatement Program protocol for residential yard sampling and removal. At a minimum, soil will be sampled from the 0 to 2-inch depth interval within decision units (e.g., front yard, back yard, play area, driveway, etc.) and those decision units exceeding the action levels will be subject to soil removal and replacement to a minimum depth of 18 inches. Removal and replacement depths will be 24 inches in gardens that could be used to grow vegetables for human consumption. Other materials, such as road base, gravel, etc., will be used as replacement material where appropriate (e.g., driveways, walkways, etc.). A lightweight geotextile marker fabric will be placed beneath the clean soil cover to indicate that the underlying soil may contain lead, arsenic and/or mercury in excess of the action levels. Soil will be removed and replaced in all accessible areas; inaccessible soil under buildings, paved areas, etc., will not be sampled or removed. All sampling and remediation activities will be implemented under a Residential Access Agreement approved by EPA. Soil remediation, where required, will be subject to a remedial action plan for each site, to be approved by EPA in consultation with DEQ.

Soil that is removed as part of the remediation program will be transported to the Butte Mine Waste Repository, which will be subject to ongoing operations and maintenance to ensure that the soils no longer pose a risk to the general public.





**Figure 12-1**  
**Residential Remediation Decision Process Flowchart**  
 Record of Decision  
 Butte Priority Soils Operable Unit  
 Silver Bow Creek/Butte Area Site



Section 12  
Selected Remedy

The following properties are identified under the Selected Remedy to be addressed under the BPSOU Residential Metals Abatement Program (Figure 12-2):

- Anaconda Sampling Works Site 137
- PA012 Dump Site 113
- 33 West Missoula

Other residential properties will be identified by the residential sampling and evaluation component of the Residential Metals Abatement Program, as described above.

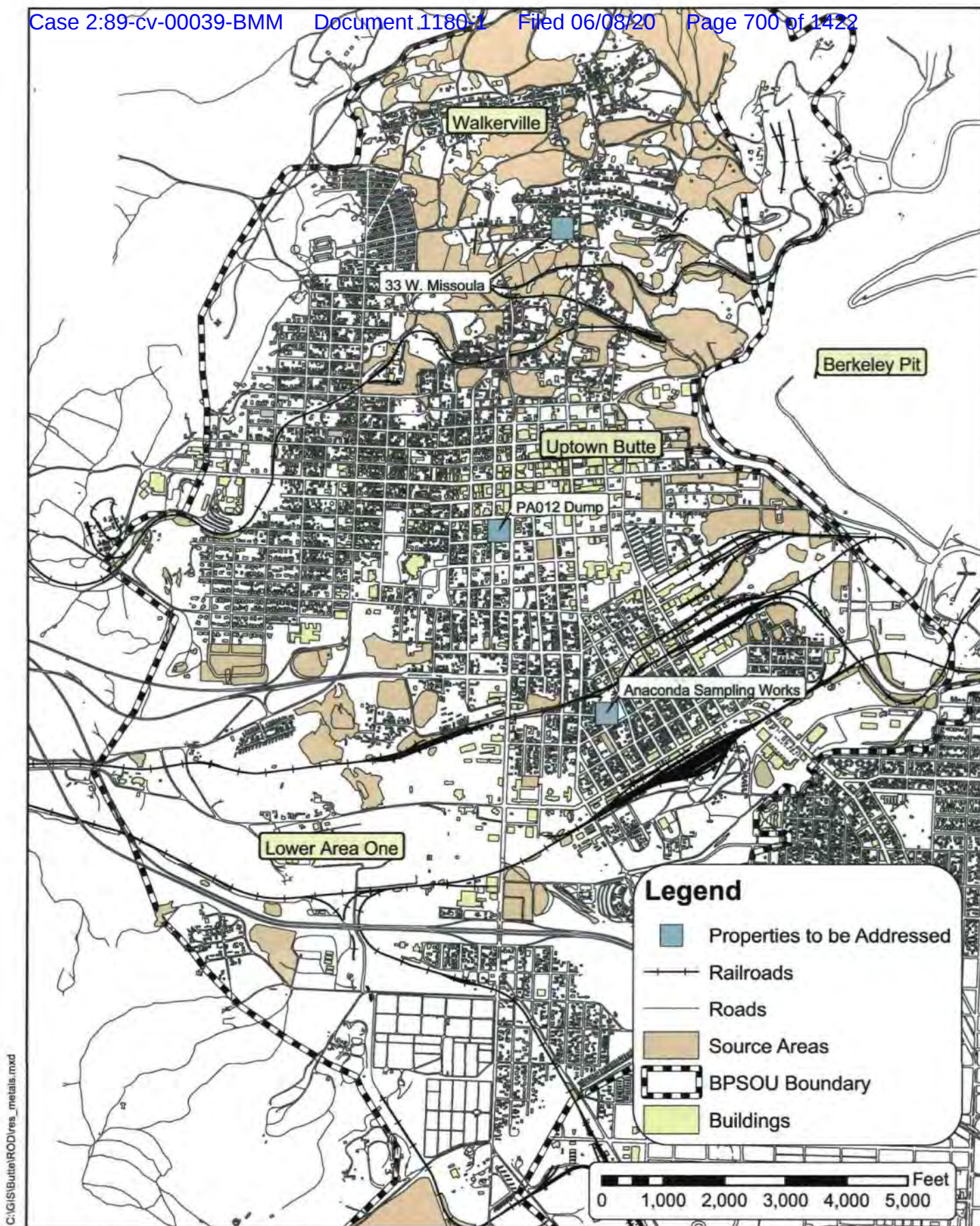
### 12.3.1.2 Non-Residential Contamination

Contaminated solid media located outside of residential areas at the BPSOU consists of waste rock piles, mill tailings, slag, contaminated soils, and aerial emissions. As described in earlier sections, much of the contaminated solid media at the BPSOU has been addressed previously through EPA response actions. Previous response actions involved a variety of engineering applications, including caps over mine waste and removals. In particular, land reclamation involving the partial or total removal of waste, grading, and covering with vegetated cover-soil caps was a vital component of most previous response actions. These response actions were designed to be consistent with the final remedy for the site and evaluations performed during the FS process determined that most previous response actions complied with ARARs and were consistent with RAOs and, therefore, were granted conditional, limited no further action status. This status does not preclude EPA from identifying additional actions to be implemented at a site (such as BMPs, storm water controls, modification of cap design, etc.), should future monitoring data indicate that the site presents undue storm water or groundwater concerns in contrast to RAOs and action levels.

Under the Selected Remedy, remaining contaminated solid media outside of residential areas will be addressed through partial or total removal and/or capping. Caps over mine waste will generally consist of vegetated cover-soil caps and will be designed and constructed in accordance with the Butte Hill Revegetation Specifications (Appendix E - BRES). Other cover types may be used in specific areas if appropriate. For example, multimedia covers may be used for mine wastes that exhibit significant leaching characteristics based on the toxicity characteristic leaching potential (TCLP) test. Concrete or asphalt covers may be used where development requires construction of parking lots or other structures.

Under the Selected Remedy, reclaimed areas (including previous response action sites and sites that are capped, reclaimed, or otherwise addressed under this ROD) will be monitored, evaluated, and maintained as necessary to achieve performance standards established in the Butte Reclamation Evaluation System. Performance standards for vegetated cover-soil caps and reclaimed lands at the BPSOU are described further in Section 12.6.1 and the entire Butte Reclamation Evaluation System document is included as Appendix E of this ROD.





**Figure 12-2: Residential Metals Abatement Properties**  
 Record of Decision  
 Butte Priority Soils Operable Unit  
 Silver Bow Creek/Butte Area NPL Site





Section 12  
Selected Remedy

There are six separate categories of non-residential sites within the BPSOU that contain contaminated solid media to be addressed under the Selected Remedy, including:

- Unreclaimed source areas containing COCs exceeding action levels;
- Source areas reclaimed under EPA order and granted "conditional, limited, no further action" status;
- Previously reclaimed sites not granted "conditional, limited, no further action" status;
- Previously reclaimed sites (not addressed under EPA order);
- Buried and/or saturated solid media in Lower Area One and the Metro Storm Drain; and
- Unreclaimed source areas not exceeding action levels but impacting surface water quality.

In addition, the Granite Mountain Memorial Interpretive Area, the Syndicate Pit Area, and the Butte Mine Waste Repository are addressed separately under the Selected Remedy in accordance with the end land use goals for these particular sites.

***Unreclaimed Source Areas Exceeding Action Levels***

Risk-based action levels established for non-residential areas are shown in Table 12-2.

**Table 12-2**  
**Action Levels for Contaminated Solid Media in Non-Residential Areas**  
Record of Decision  
Butte Priority Soils Operable Unit  
Silver Bow Creek/Butte Area NPL Site

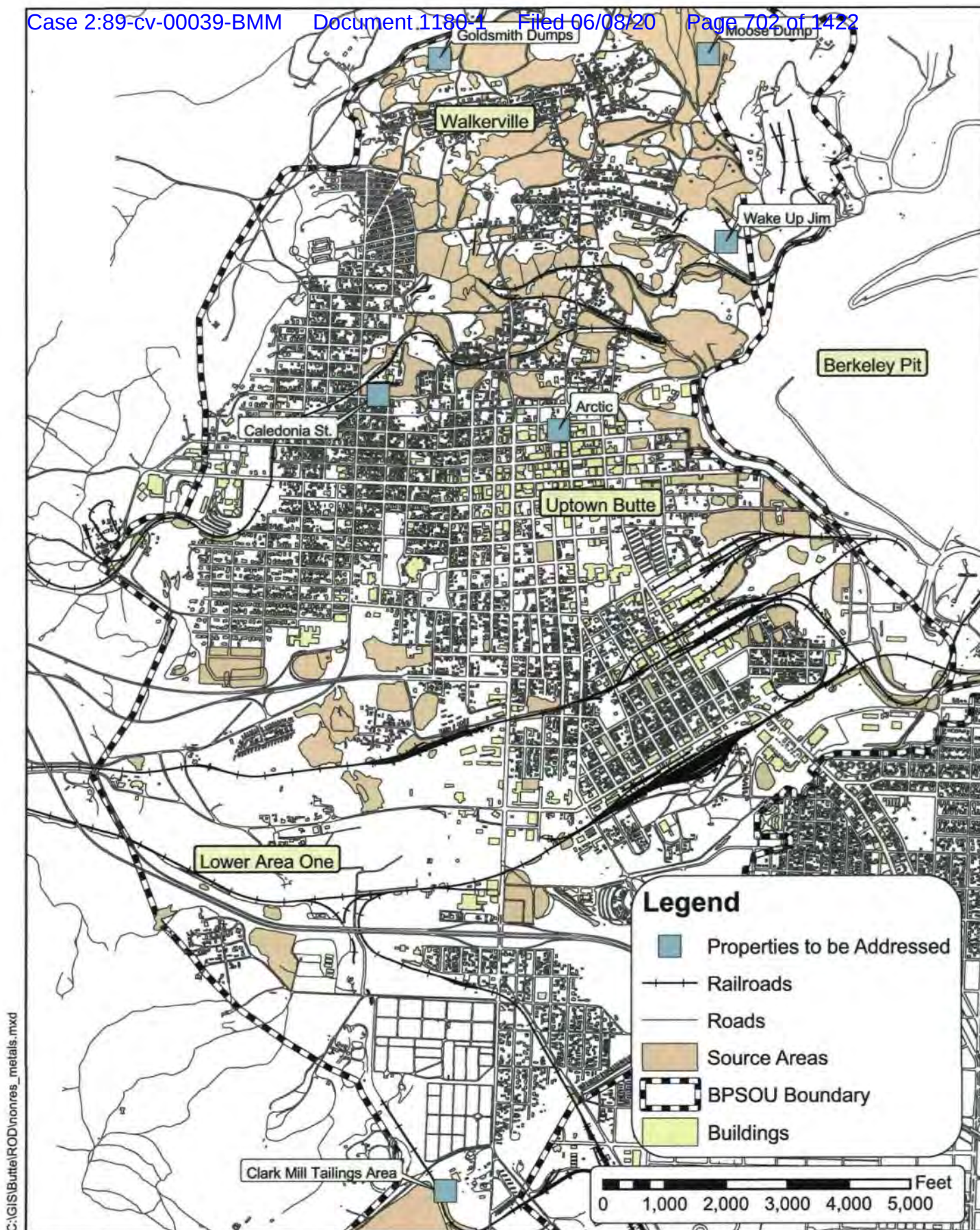
Contaminant	Commercial/Industrial	Recreational
Lead	2,300 mg/kg	2,300 mg/kg
Arsenic	500 mg/kg	1,000 mg/kg

Very few unreclaimed source areas remain at the BPSOU with arsenic or lead concentrations greater than action levels. Areas that are identified will be removed or capped in accordance with the Butte Hill Revegetation Specifications and site-specific design plans. Remaining source areas at the BPSOU that exceed the lead or arsenic action levels are shown in Figure 12-3 and include:

- Goldsmith Dumps Site 161
- Arctic Site 1530
- Wake Up Jim Site 1615
- Small waste areas surrounding Clark Mill Tailings repository
- Caledonia Street
- Moose Dump Site 12

Also, in the future, if and when any new source areas are identified that exceed the risk-based action levels for lead and/or arsenic they will be remediated accordingly.





**Figure 12-3: Non-Residential Metals Abatement Properties**  
 Record of Decision  
 Butte Priority Soils Operable Unit  
 Silver Bow Creek/Butte Area NPL Site





***Source Areas Reclaimed Under EPA Order and Granted Conditional, Limited No-Further Action Status***

Areas of the BPSOU that have been reclaimed during previous actions and that met ARARs and remedial action objectives as reported in the Response Action Summary Document will require periodic evaluation pursuant to the Butte Reclamation Evaluation System (Appendix E). If any of these sites are identified as sources of heavy metals or arsenic to surface water runoff, they are subject to additional actions to be taken under the Storm Water BMP program in accordance with the Butte Hill Revegetation Specifications and site-specific design plans.

***Previously Reclaimed Sites Not Granted "Conditional, Limited No Further Action" Status***

Areas of the BPSOU that have been addressed during previous response actions and that were determined NOT to meet ARARs and RAOs in the Response Action Summary Document were the following three sites (Figure 12-4):

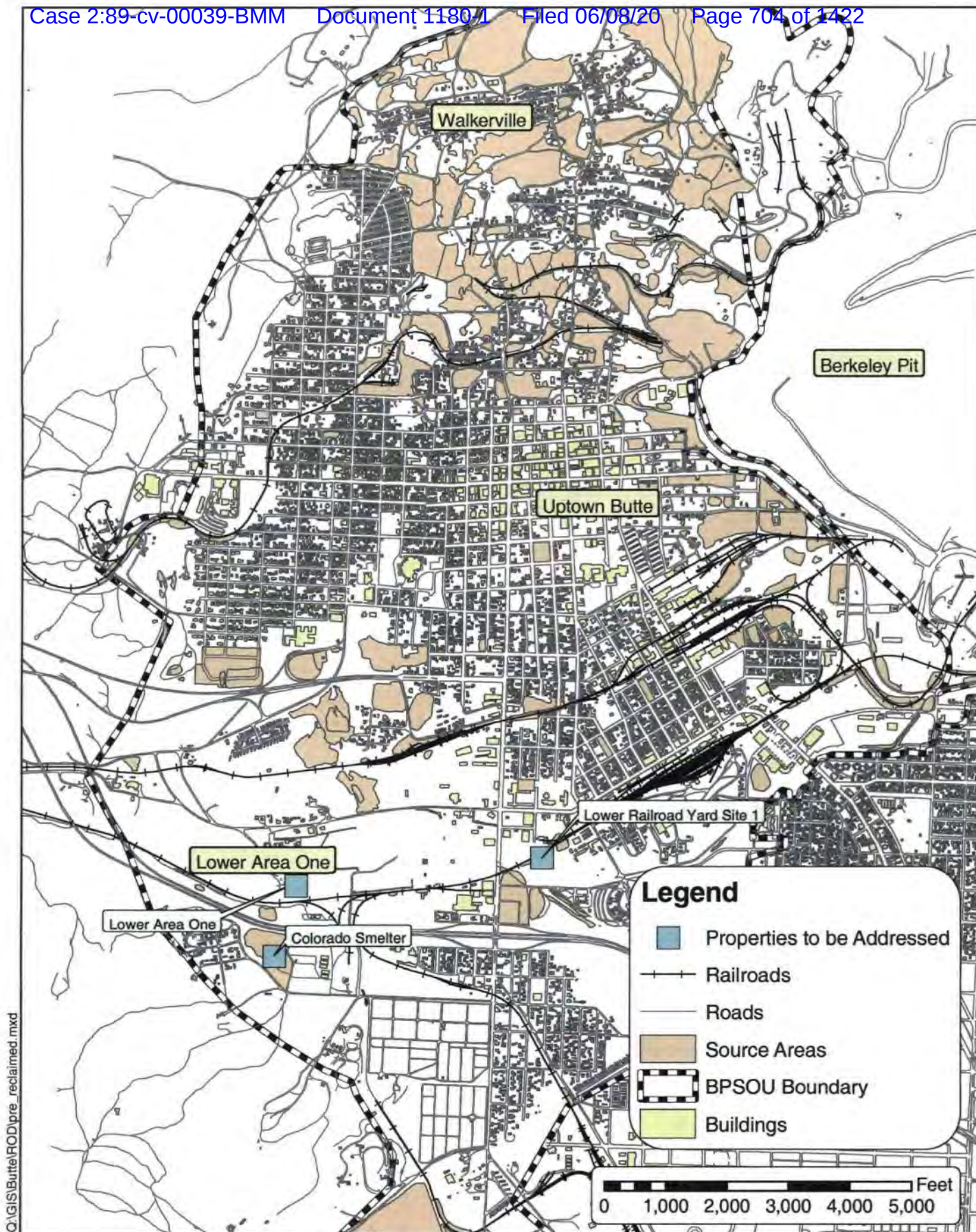
- Colorado Smelter
- Lower Railroad Yard Site 1
- Lower Area One

The basis for not granting these sites conditional, limited, no further action status is described below together with the remedial action plans for each site, respectively, under the Selected Remedy.

The Colorado Smelter Site was addressed in 1990 and 1991 under EPA Unilateral Administrative Order Docket No. CERCLA-VIII-92-04. The response action involved removing approximately 40,000 cubic yards of mine waste and consolidating the waste in an on-site repository in the southeastern corner of the property adjacent to Greenwood Avenue. The site was subsequently reclaimed and drainage channels were installed. Additional response actions in 1996 consisted of reshaping of an existing ditch to reroute storm water runoff to the culvert passing under Interstate 90.

The Colorado Smelter Site was found to potentially be out of compliance with ARM 17.50.505 regarding location specific requirements for solid waste facilities. Additionally, the rationale for granting a variance did not sufficiently demonstrate the necessary substantive conditions for the variance found at § 75-10-206 Montana Code Annotated (MCA) regarding the requirement for adequate separation between waste materials and groundwater. Subsequent to the evaluation performed in the Response Action Summary Document, an evaluation of the depth to groundwater beneath the repository at the Colorado Smelter Site suggests that there may be adequate separation between the groundwater and the base of the wastes (> 10 feet) under most site conditions. However, monitoring well control at the site is limited and data from the existing wells suggest that the depth to groundwater beneath the wastes in the repository may be less than 10 feet during exceptionally wet years when the groundwater table rises more than normal.





**Figure 12-4: Previously Reclaimed Sites not Meeting ARARs**  
 Record of Decision  
 Butte Priority Soils Operable Unit  
 Silver Bow Creek/Butte Area NPL Site





*Section 12*  
*Selected Remedy*

Under the Selected Remedy, a work plan specific to this area will be prepared and approved by EPA. The document will present a plan to obtain time-series groundwater elevation data for determining the frequency and duration of periods when the surface of the groundwater table rises to within 10 feet of the base of the wastes in the repository. At a minimum, two additional groundwater monitoring wells will be installed at locations adjacent to the repository. Data loggers will be placed in the existing and the new wells located near the repository to obtain water level data on a daily or more frequent basis for each well. Also, during wet weather conditions when flow occurs in the drainage channels near the repository, flow data will be collected and recorded at least once over the reach upstream and through the Colorado Smelter Site to determine if infiltration from the channels may be influencing groundwater elevation beneath the repository area. Groundwater elevation data will be obtained for a period of no less than four years and until EPA is satisfied that the reasonable maximum range of seasonal fluctuations in the water table beneath the Colorado Smelter Site repository is understood. If the data indicate that groundwater levels rise to within 10 feet of the base of the repository, violating the separation required by the ARAR, then the wastes at the Colorado Smelter Site will be removed and placed in the Butte Mine Waste Repository. The excavated site will then be reclaimed.

The Lower Railroad Yard Site 1 was addressed as part of the Railroad Beds TCRA conducted from 1999 through 2004. The Lower Railroad Site 1 is located within the Silver Bow Creek floodplain. Similar to the Colorado Smelter Site described above, the Response Action Summary Document determined that the Lower Railroad Site 1 was not in compliance with ARM 17.50.505 regarding location specific requirements for solid waste facilities. Wastes from the Lower Railroad Site 1 will be removed to a designated repository.

The Lower Area One Site was addressed under the Lower Area One N-TCRA in 1997 and 1998. Approximately 1.2 million cubic yards of waste and contaminated soil was removed from the Silver Bow Creek floodplain and Silver Bow Creek was reconstructed at a higher elevation to prevent the gaining of contaminated groundwater during Phase I. Also, a hydraulic interception system was constructed to capture contaminated groundwater so it cannot discharge to Silver Bow Creek. During Phase II, groundwater and surface water quality and characteristics were thoroughly monitored and evaluated to assess the effectiveness of hydraulic controls and movement of groundwater. Wetland treatment lagoons to treat captured groundwater were evaluated during Phase II to assist in reaching a final decision on treatment technology selection. The final reclamation and land use decisions for Lower Area One are the objectives of Phase III. These decisions and implementation of actions at Lower Area One are incorporated into this ROD.

The full Selected Remedy for the Lower Area One site is described below in Groundwater Components (Section 12.3.2).



***Unreclaimed Source Areas Not Exceeding Action Levels***

Many areas within the BPSOU that contain mining related wastes or contaminated soils were not addressed during previous response actions because action levels for arsenic or lead were not exceeded. Many of these areas remain unreclaimed at the site because they do not pose a human health risk and there has been no demonstrated aquatic risks linked to these sites.

Under the Selected Remedy, an unreclaimed, disturbed site that does not exceed lead or arsenic action levels, will still be addressed if future data collection under the surface water monitoring and BMP program demonstrates that contaminants of concern (i.e., copper and zinc) from the site are migrating off-site and impacting surface water quality in Silver Bow Creek, Blacktail Creek, or Grove Gulch Creek. To the extent that applicable water quality standards are exceeded, remedial actions will be implemented. The action to be implemented will be determined during design, but will likely be capping with limited removal and reclamation. These sites will also be evaluated and maintained over the long-term in accordance with the Butte Reclamation Evaluation System, the Butte Hill Revegetation Specifications, and site-specific design plans.

EPA, in consultation with the State, has determined that the following list of sites will be addressed as an initial BMP action under the Selected Remedy (Figure 12-5):

- Back Fill 007 Site 65
- Unnamed Dump Site 148
- New and Mahoney Street
- 413 Boardman Street
- Jenny Dell Site 33
- Kelley Mine Yard Entrance
- North Wyoming Street
- 800 North Main
- North Corner of Granite and Arizona
- Green Mountain Shaft
- Stream banks, sediment and over bank deposits from and including the Blacktail Creek/Metro Storm Drain confluence area to Lower Area One
- 424 North Washington Street
- 131 West Copper Street



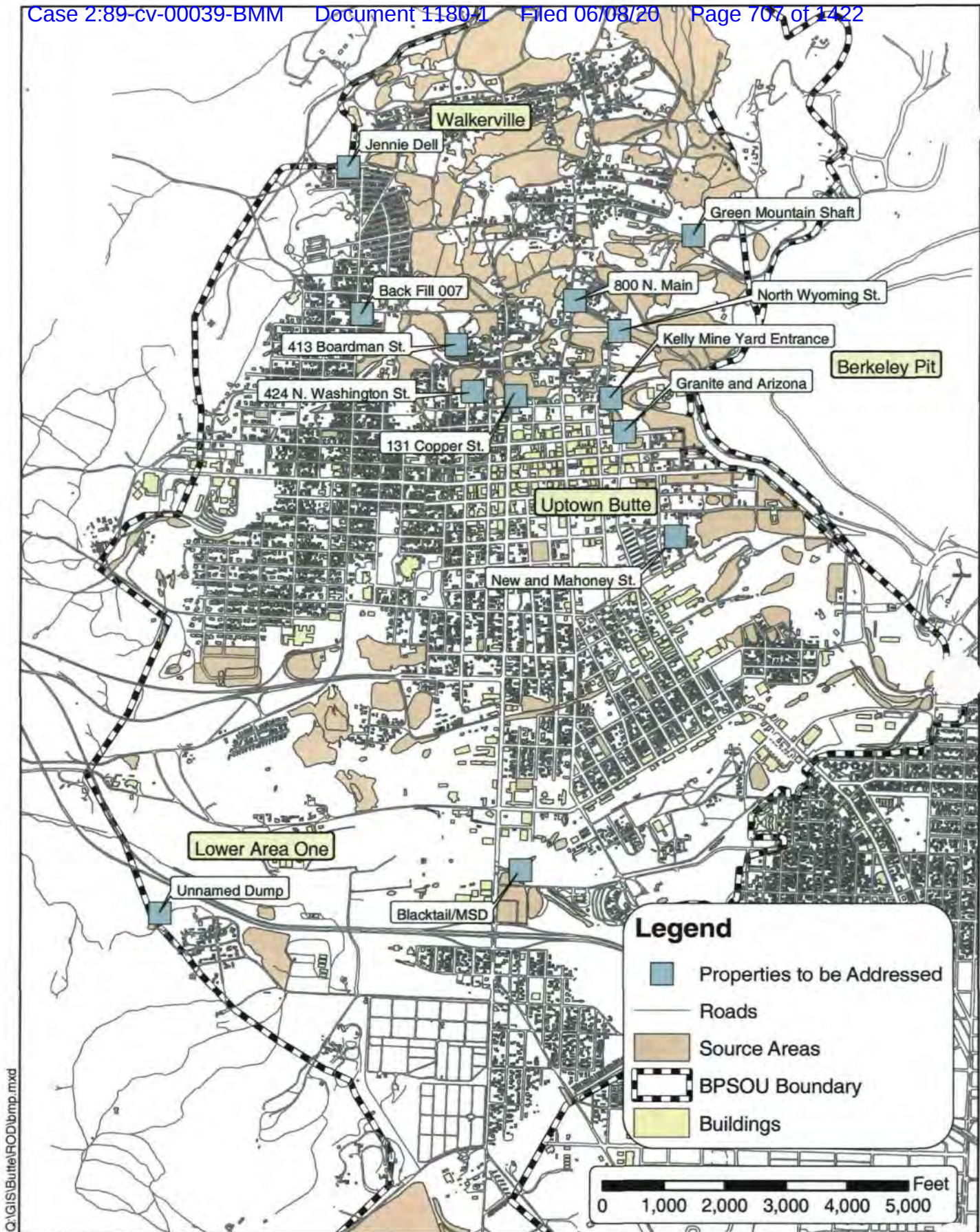


Figure 12-5: Sites to be Addressed as Initial BMP Actions

Record of Decision  
Butte Priority Soils Operable Unit  
Silver Bow Creek/Butte Area NPL Site





***Previously Reclaimed Sites (Not Addressed Under EPA Order)***

Sites where reclamation took place outside of removal actions mandated by EPA will require inspection and possible further reclamation. These sites will be evaluated in accordance with the Butte Reclamation Evaluation System. If it is determined that further action is needed, construction specifications will be determined during design. Additional actions that may be required include removal and capping of wastes in a manner that is determined by the use of the Butte Hill Revegetation Specifications.

***Buried and/or Saturated Solid Media in Lower Area One and the Metro Storm Drain***

Buried and/or saturated solid media in Lower Area One and Metro Storm Drain will remain in place with appropriate groundwater monitoring and institutional controls.

***Granite Mountain Memorial Area***

Under the Selected Remedy, the conceptual design plan for the Granite Mountain Memorial Interpretive Area (Appendix E-4 of the Final FS Report [PRP Group 2004]) will be finalized with EPA approval and implemented. The Granite Mountain Memorial Interpretive Area will be a part of Montana's Copperway Regional Heritage Park. Various reclamation and other enhancements to the historic Granite Mountain Memorial Area will be implemented. These include: reclaiming source areas in publicly used areas, restricting access to certain areas of the historic mining landscape, installing picnic areas and walking trails, enhancing existing vegetation, and diverting storm water runoff to the Berkeley Pit. These actions will be consistent with historical preservation requirements and other standards and the county's historical park plan.

***Syndicate Pit***

The Selected Remedy for the Syndicate Pit calls for its reuse as a mine training center with reclamation to the maximum extent practicable (Syndicate Pit remedial Option 2 - Appendix E-2B of the Final FS Report [PRP Group 2004]), as further developed and approved by EPA during remedial design. Shallow to moderate slopes will be reclaimed using soil caps, rock caps, and gravel parking areas. Steep slopes will not be reclaimed. The base of the pit will continue to be used to detain storm water and capture sediment during wet-weather runoff conditions.

***Butte Mine Waste Repository***

When full, the existing Butte Mine Waste Repository will be closed in accordance with an EPA-approved design plan and closure will be performed in compliance with all pertinent ARARs. A new repository will be sited next to the existing repository if and when additional capacity is needed. All future repositories used to contain mine wastes from the BPSOU will be closed in a manner consistent with the initial repository closure, according to site-specific design plans, and shall comply with all pertinent ARARs. Closed repositories will be evaluated and maintained over the long-term in accordance with the Butte Reclamation Evaluation System, the Butte Hill Revegetation Specifications, and site-specific design plans.



### 12.3.2 Selected Remedy for Groundwater

The alluvial aquifer within the BPSOU lies beneath the Silver Bow Creek floodplain and extends from the upper Metro Storm Drain near the south rim of the Berkeley Pit to the west end of Lower Area One where Silver Bow Creek exits the OU.

Approximately 3.4 million cubic yards of mine waste (primarily mill and smelter tailings) were historically impounded within the Silver Bow Creek floodplain. Roughly 2.0 million cubic yards of tailings associated with the historic Colorado Smelter and Butte Reduction Works were deposited in Lower Area One; 1.2 million cubic yards of which were removed in 1997 and 1998. Additionally, tailings and slag associated with the historic Parrott Smelter together with waste rock, contaminated soil, and other fill material in the Metro Storm Drain Area total an estimated 1.4 million cubic yards. Waste materials present in Lower Area One and Metro Storm Drain have lain directly over or below the water table for the past century and have had a severe impact on groundwater quality throughout the Silver Bow Creek corridor. COC concentrations exceed action levels throughout most of the alluvial aquifer between upper Metro Storm Drain and the west end of Lower Area One, and often by several orders of magnitude. Within the Metro Storm Drain, groundwater is contaminated to depths exceeding 150 feet.

Prior to Superfund action in Butte, surface water quality in Silver Bow Creek was impaired by the inflow of severely contaminated groundwater and from direct contact with waste materials. To reduce contaminant loads in Silver Bow Creek and protect remedial actions at other OUs downstream of Butte, EPA implemented expedited response actions within the BPSOU. Capturing and treating groundwater is the most effective means to address groundwater contamination as the Expedited Response Action at Lower Area One has demonstrated. Similarly, the Focused Feasibility Study for the Metro Storm Drain concluded that the alluvial aquifer in the Metro Storm Drain cannot be remediated to the degree that groundwater would meet ARARs within a reasonable time frame, even if waste materials were totally removed. EPA has concluded that total removal of all sources of groundwater contamination is not feasible and, more significantly, that remediation of the alluvial aquifer is not technically practicable. This is due to the difficulty of removing all discrete wastes, much of which are difficult to access because of infrastructure and the chronic release of contaminants for residual contamination in the alluvial aquifer. The cost-effectiveness of a total removal remedy is further reduced by the common acknowledgement that capture and treatment of alluvial groundwater would still be required over the long-term (for centuries), even if source areas are removed. Because groundwater contamination within the alluvial aquifer is expected to exceed ARARs for the long-term and because statutory and regulatory conditions for a technical impracticability waiver are met, applicable groundwater ARARs have been waived for the alluvial aquifer within the boundary of the technical impracticability (TI) zone (Figure 12-6) and wastes will be left in place with appropriate groundwater monitoring and institutional controls. The TI Evaluation is contained in the Administrative Record for the BPSOU, along with EPA's detailed response to comments on the draft TI Evaluation.







*Section 12*  
*Selected Remedy*

The Selected Remedy for groundwater includes the following components:

1. **Waste Left in Place.** Buried and/or saturated solid media in Lower Area One and Metro Storm Drain will remain in place with appropriate groundwater monitoring and institutional controls. To reduce the loading of metals to groundwater from the Parrott Tailings, the Diggings East, and Northside Tailings, infiltration barriers shall be considered during remedial design and implemented if determined to be appropriate by EPA, in consultation with DEQ. The sedimentation basin/former wetland demonstration project area near the intersection of Kaw Avenue and George Street shall also be reclaimed according to the intended future land use, and may be used as a potential storm water retention/detention basin under the Surface Water Management Program.
2. **Groundwater Capture and Treatment – MSD Area.** Contaminated alluvial groundwater in the MSD shall be captured with the subdrain under the MSD channel, and/or another appropriate groundwater collection system. The captured groundwater shall continue to be pumped from the terminal vault in the MSD to the treatment facility at LAO. The captured and pumped water will be treated by lime precipitation technology as described below in subparagraph 4 before being discharged to Silver Bow Creek. However, because issues regarding long-term performance of the subdrain have not been fully addressed to date, the Selected Remedy also includes a 5-year shakedown period to evaluate the reliability of the MSD subdrain collection system. During this shakedown period, an approved operation and maintenance plan shall be developed for the collection system. If during the shakedown period, monitoring data demonstrate that the subdrain is not effectively collecting contaminated groundwater, or is spreading contamination downgradient, a new or modified groundwater collection system shall be designed and built.
3. **Groundwater Capture and Treatment – LAO.** Contaminated alluvial groundwater at LAO and base flow from Missoula Gulch shall be intercepted in a hydraulic control channel that runs parallel to Silver Bow Creek and routed to the treatment lagoon facility described below. If groundwater inflow between the MSD and LAO capture systems (i.e., between the end of the MSD subdrain and the start of the hydraulic control channel) is found to adversely affect surface water quality, additional groundwater capture and hydraulic control systems shall be designed and built. In addition, water from the Mine Flooding OU West Camp System will be routed to the hydraulic control channel at Lower Area One for treatment through the treatment facility.
4. **Groundwater Treatment Facility.** As part of the RI/FS, Atlantic Richfield has constructed a lagoon treatment system at Lower Area One as a demonstration project. Data from discharges from this system is encouraging. The system has been meeting aquatic life standards for copper, cadmium, and zinc at the point of discharge. Arsenic standards have been met on all but a few occasions. These data are especially encouraging for cadmium discharges – conventional treatment systems have had problems meeting the cadmium standard because of reduced



holding times in such facilities. The lagoon treatment system's longer holding times appear to be effective in treating cadmium. Accordingly, the Selected Remedy includes retention and continued operation of the lagoon system for treating captured and routed groundwater prior to discharge to Silver Bow Creek. However, because issues regarding long-term performance and sludge removal and disposal have not been fully addressed to date, the Selected Remedy also includes the following:

- a. A 5-year shakedown period will be in place for the lagoon treatment system. The captured groundwater will be treated to DEQ-7 standards (Table 8-2) prior to discharge. The lagoon treatment system must demonstrate successful water treatment and full compliance with the standards, when operating at designed capacity, and when operating under a wide range of conditions. Also, it must be demonstrated that sludge removal and sludge management can be performed effectively without causing system upsets. AR made modifications to expand the capacity of the treatment lagoons that did not go through the formal EPA design, review, and approval process. Therefore, those modifications and any additional design of the expanded treatment lagoon system will need to go through the formal EPA review and approval process. The lagoon treatment system shall be designed to prevent the release of untreated contaminated waters into Silver Bow Creek, as a result of upset periods due to flooding, equipment malfunction or failure, or extended periods of cold, etc. ARAR compliant sludge removal, management, and disposal plans must be developed and approved.
  - b. Using the Butte Reduction Works area, near the lagoon treatment system, for sludge drying and sludge management is not allowed, since it is a dedicated open space area more suitable for public use.
  - c. If at any time during the shakedown period or thereafter the system fails to meet discharge standards and cannot be adjusted or modified to meet standards, or if sludge removal, management, and disposal cannot be done in compliance with ARARs and in a protective manner, a conventional lime treatment system shall be designed and built at the Lower Area One area, which shall use lime treatment technology to treat the captured contaminated water and meet all discharge standards.
  - d. To prevent the discharge of untreated water into Silver Bow Creek, the design will be required to include contingencies for how to manage and store collected groundwater during extended periods of upset (e.g., flooding, equipment malfunction or failure, extended periods of freezing, etc.).
5. **Groundwater Monitoring.** A comprehensive groundwater monitoring plan shall be prepared and implemented for the entire alluvial aquifer to ensure that groundwater capture systems are effective; to determine that contaminated



groundwater is not leaving the TI Zone or discharging to surface water; to provide additional information as necessary on the movement, quality, and quantity groundwater; and to provide data for review of the groundwater remedy. This monitoring system shall include expanded wells and measurements from the existing system, and shall provide for the careful and thorough monitoring that includes, but is not limited to, groundwater near Blacktail Creek, the groundwater between the MSD and LAO groundwater capture systems, groundwater adjacent to the lagoon treatment system, and groundwater downgradient (west) of the BPSOU. An initial outline of groundwater monitoring requirements is included in Section 12.3.2.3.

6. **Controlled Groundwater Area.** A controlled groundwater area shall be established for the alluvial aquifer to prevent domestic use of this water and to prevent any well development that would exacerbate or spread existing contamination. Other institutional controls, such as county laws or regulations regarding domestic use of groundwater in the area, may also be required.

#### **12.3.2.1 Metro Storm Drain**

Mine waste materials in the Metro Storm Drain area include the Parrott Tailings, North Side Tailings, Diggings East Tailings and Lower Metro Storm Drain Tailings. These buried and partially saturated deposits consist of overburden, tailings, slag, waste rock, and other miscellaneous contaminated fill material with an estimated total volume of 2.2 million cubic yards.

The Selected Remedy requires the buried and partially saturated wastes be left in place with appropriate groundwater monitoring and ICs. A thorough monitoring plan will be required to provide information to assure that the groundwater collection system is effective and that contaminant plumes are not expanding or are a threat to Blacktail Creek or Silver Bow Creek. The data provided by the monitoring plan will build upon prior monitoring of the BPSOU alluvial aquifer. A controlled groundwater area will be established through the appropriate process for the alluvial aquifer, including the Metro Storm Drain, which will provide for long-term protection of human health.

Current land use practices in the MSD, particularly in some areas overlying portions of the Parrott Tailings, do not limit recharge of groundwater. Irrigated ball fields and unpaved portions of the City County Shops overlie a portion of the Parrott Tailings. Recharge of the groundwater is significantly increased by irrigation of the ball fields, and plowed snow is frequently piled on the County Shop property. To reduce the loading of metals to groundwater in the area overlying the Parrott Tailings, infiltration barriers shall be considered during the design phase and implemented if determined to be appropriate by EPA, in consultation with the State. Installation of infiltration barriers under the ball fields and additional paving at the County Shops (or construction of some other suitable barrier) can be expected to reduce loading of metals to the aquifer. Infiltration barriers shall also be considered in the lower portion of the MSD below Harrison Avenue (e.g., Diggings East Tailings, Northside Tailings, etc.) during remedial design.



The sedimentation basin/former wetland demonstration project area near the intersection of Kaw Avenue and George Street shall also be reclaimed according to the intended future land use and may be used as a potential storm water retention/detention basin under the Surface Water Management Program.

The subdrain, which was installed in 2003 and 2004, extends approximately 4,000 feet through lower Metro Storm Drain. Contaminated alluvial groundwater in the MSD shall be captured with the subdrain under the MSD channel, and/or another appropriate groundwater collection system. The captured groundwater shall continue to be pumped from the terminal vault in the MSD to the treatment facility at LAO. The captured and pumped water will be treated by lime precipitation technology as described below before being discharged to Silver Bow Creek. However, because issues regarding long-term performance of the subdrain have not been fully addressed to date, the Selected Remedy also includes a 5-year shakedown period to evaluate the reliability of the MSD subdrain collection system. During this shakedown period, an approved operation and maintenance plan shall be developed for the collection system. If during the shakedown period, monitoring data demonstrate that the subdrain is not effectively collecting contaminated groundwater, or is spreading contamination downgradient, a new or modified groundwater collection system will be designed and built.

Collection of groundwater by the interception field under the channel of Metro Storm Drain will protect Silver Bow Creek and Blacktail Creek from the input of contaminated groundwater that has threatened these receiving waters in the past.

#### **12.3.2.2 Lower Area One**

Waste materials remain at Lower Area One and the Butte Reduction Works following the removal action performed in the area. There are inaccessible wastes and contaminated soils underlying the Municipal Sewage Treatment Plant, the utilities that cross the area and the historic slag walls and aqueduct. In addition, there are wastes and contaminated soils that were not removed by the Lower Area One ERA because they were below the vertical excavation limit established as a performance standard for the ERA.

In the same way that remaining wastes will be managed for the Metro Storm Drain component of the remedy described above, remaining wastes and contaminated soils at Lower Area One will be left in place with appropriate groundwater monitoring and institutional controls.

Hydraulic controls constructed in the vicinity of the historic Colorado Tailings and Butte Reduction Works during the Lower Area One ERA to capture, control, and extract contaminated alluvial groundwater are incorporated into the Selected Remedy. These groundwater control measures consist of a hydraulic control channel and a series of three open water areas that will be operated to manage groundwater elevations and manipulate flow to enhance the effectiveness of the collection system. In addition, Silver Bow Creek was reconstructed during the ERA at a higher elevation to prevent any groundwater discharge to the creek as it flows through Lower Area



One. The system has operated since 1998 and has effectively prevented contaminated alluvial groundwater from flowing off site due to an alluvial groundwater capture efficiency that exceeds 90 percent effectiveness based on mass balance studies.

Groundwater controls have not been implemented between the end of the MSD subdrain and the start of the hydraulic control channel. Contaminated sediment in this area will be removed (see the remedy description under Surface Water). Following removal of the in-stream sediments, further evaluation of surface water quality in this area will be conducted. If groundwater inflow between the MSD and LAO capture systems is found to adversely affect surface water quality, additional groundwater capture and hydraulic control shall be developed and implemented in this area.

### **12.3.2.3 Groundwater Monitoring**

A comprehensive groundwater monitoring plan shall be prepared and implemented for the entire alluvial aquifer to ensure that groundwater controls are effective; to provide additional information as necessary on the movement, quality, and quantity groundwater; and to provide data for review of the groundwater remedy. This monitoring system shall include expanded wells and measurements from the existing system, and shall provide for the careful and thorough groundwater monitoring near Blacktail Creek and the groundwater between the MSD and LAO groundwater capture systems. The monitoring plan will also include wells down-gradient of BPSOU to gather information on the characteristics of the groundwater and to assure that downstream waters are not being affected by groundwater leaving BPSOU.

If the data suggest that the contaminant plume(s) is a threat to surface water or clean groundwater, the remedy will be enhanced to address the threat. The selection of engineering improvements to enhance the Selected Remedy shall be based on thorough evaluation and interpretation of the additional data.

An initial outline of the minimum requirements of the groundwater monitoring program follows. The details of the monitoring program will be developed during remedial design:

1. All monitoring wells in the BPSOU alluvial aquifer (MSD, LAO, and between) will be sampled every 5 years. Additionally, EPA in consultation with DEQ will identify a network of wells for annual water quality sampling.
2. Water levels will be measured in all wells and certain surface water locations twice per year. Water levels will be measured in a select network on a monthly basis, or more frequently if necessary for operation of the capture and treatment system.
3. Monitoring activities will be coordinated with the Butte Mine Flooding Operable Unit monitoring program managed by the Montana Bureau of Mines and Geology as there is overlap in the monitoring well networks.



4. Additional monitoring wells will be installed throughout the MSD as needed to determine flow direction, gradients, and groundwater quality. Additional monitoring wells will be installed in areas where the extent(s) of groundwater plumes are uncertain. These will also include additional nested well sets in key areas of the floodplain, additional mid-level and deep wells, and possibly bedrock wells.
5. Wells will also be installed, as necessary, to monitor the subdrain.
6. One pumping test will be conducted on a mid-level well, in upper MSD to determine if the sub-drain will influence flow in the mid-level portion of the aquifer.
7. The groundwater loads entering the MSD sub-drain will be monitored annually in the fall (base flow) using dye tracer methods to determine flow and standard sampling to measure metals and arsenic concentrations. Load monitoring will assure that the sub-drain continues to operate as expected, and is not fouling or clogging. In addition, the mass balance will be used to determine if the pumping rate is matching the groundwater collection rate, and assure that the sub-drain is not adding contaminated groundwater back into the aquifer in the vicinity of the pump vault. In addition, two monitoring wells will be installed adjacent to MSD; just down-gradient of the pump vault to assure that captured groundwater is not leaving the capture system.
8. A network of nested wells will be installed between the Metro Storm Drain and Blacktail Creek.
9. At least two nested well groupings (three wells each grouping) will be installed at the very west end of the BPSOU as Point of Compliance wells. Each well group will consist of a shallow alluvial aquifer well and a deeper weathered bedrock well, and a deep solid bedrock well.

#### **12.3.2.4 Waste Left in Place in Metro Storm Drain and Lower Area One**

Under the Selected Remedy wastes and contaminated soils will be left in place in the Metro Storm Drain and Lower Area One areas overlying the TI zone. This would include the Parrott Tailings, Northside Tailings, Diggings East Tailings and the non-discrete wastes and contaminated soils dispersed throughout the Metro Storm Drain floodplain. Removal of waste material within these areas and restoration of groundwater beneath has been determined by EPA to be technically impracticable and not cost effective. Groundwater will be captured and treated to performance standards for surface water prior to its discharge to Silver Bow Creek. The Selected Remedy also requires that the contaminated plumes be prevented from migrating outside the established TI zone (Figure 12-6) and that a controlled groundwater area and other institutional controls be implemented to prevent exposure to contaminated groundwater. ARARs waivers and performance standards for alluvial groundwater are defined in Section 12.6.2.



#### **12.3.2.5 Controlled Groundwater Area**

A controlled groundwater area will be established in the Alluvial Aquifer TI Zone to prevent domestic use of contaminated water, exacerbation or spreading of existing contamination or release of highly contaminated groundwater to surface water resources through irrigation. The controlled groundwater area will prevent new well development, except for CERCLA monitoring wells, well systems that treat contaminated water prior to use, and use of existing domestic and commercial wells. To the extent a controlled groundwater area will not prevent the use of existing wells, an education and well abandonment program will be implemented to persuade owners not to use contaminated water and to voluntarily take existing wells out of service in exchange, for example, for being hooked up to public water. An administrative entity will be identified under RD/RA to monitor and enforce these restrictions. The RP Group will be responsible for developing, funding and implementing the ICs as part of the final site-wide ICs Plan.

#### **12.3.2.6 Groundwater Treatment**

The Selected Remedy requires treating groundwater captured by the network of hydraulic controls at Lower Area One and the Metro Storm Drain. In addition, groundwater from the West Camp bedrock system of the Mine Flooding OU, and base flow from the Missoula Gulch drainage will be routed to the treatment facility. The treatment facility will consist of a treatment lagoon system to be operated for an initial 5-year shakedown period, as described above. The treatment lagoon system must be designed to meet discharge standards and surface water ARARs. The treated water will then be discharged to Silver Bow Creek or potentially used for other beneficial purposes. Treatment capacity for the facility will be determined during remedial design.

### **12.3.3 Selected Remedy for Surface Water**

The Selected Remedy for surface water consists of the following components:

1. The Surface Water Management Program which utilizes BMPs to address contaminated storm water runoff and improve storm water quality.
2. Excavation and removal to a repository of contaminated sediments from the stream bed, banks, and adjacent floodplain along Blacktail Creek and Silver Bow Creek, from just above the confluence of Blacktail Creek and Metro Storm Drain to the beginning of the reconstructed Silver Bow Creek floodplain at Lower Area One. Following removal of the in-stream sediments, further evaluation of surface water quality in this area will be conducted. If groundwater inflow is found to adversely affect surface water quality, additional hydraulic controls and groundwater capture shall be implemented.
3. Capture and treatment of storm water runoff up to a specified maximum storm event, if BMPs implemented under the Surface Water Management



Program do not achieve the goal of meeting surface water standards in Silver Bow Creek during storm water events.

4. Hydraulic control, capture, and treatment of contaminated groundwater to prevent its discharge to Silver Bow Creek surface water (as described in Section 12.3.2).
5. In-stream flow augmentation as appropriate. Flow augmentation will not be considered until the major remedial components described in this ROD are designed and implemented.

#### **12.3.3.1 Surface Water Management for Storm Water Remediation**

The Surface Water Management Program will employ a diverse range of BMPs to control loading of heavy metals and arsenic to Silver Bow Creek, Blacktail Creek, and Grove Gulch during storm water flow conditions. Performance standards for surface water are presented in Section 12.6.3. The document guiding the Surface Water Management Program, which includes the elements described in this section, will be finalized during remedial design.

The Surface Water Management Program employs an iterative process to achieve the ultimate goal of meeting surface water standards during storm events. Each cycle consists of monitoring the drainages and BMP components and then using the data to optimize the BMP components and/or evaluate the need for additional BMPs through loading analysis. After a cycle is completed, the results will be evaluated to determine the progress made in achieving surface water standards during storm flows. Monitoring, analysis, BMP implementation, and program reporting will be completed annually. If goals have not been achieved, the cycle will be repeated. The following 5 steps will be performed for each annual cycle:

1. **Monitoring.** Surface water monitoring will be performed to measure progress in achieving surface water quality standards during storm water flow and to measure the performance on the BMPs implemented in the preceding cycle to provide data for analysis of compliance with action levels and performance standards and to evaluate the degree and location of continued contaminant loading to receiving surface waters.
2. **Compliance Analysis.** Analysis of data to evaluate compliance with performance standards.
3. **Loading Analysis.** Assess contaminant loading to receiving surface waters. This helps identify potential loading sources and assists in determining where new BMPs may be needed.
4. **BMP Selection.** Identification and prioritization (based on the previous steps and other indicators) of specific new BMPs (type and location).



**5. BMP Implementation.** BMPs will be implemented to address compliance with regulatory goals.

In addition, specific monitoring on the performance of catch basins CB-8 and CB-9 shall be conducted during remedial design to determine the effectiveness of these sediment basins and how to optimize their operation.

Under the Selected Remedy, BMPs include, but are not limited to:

- Source controls on mine wastes or contaminated soil with arsenic and lead concentrations below human health action levels, but with elevated concentrations of other contaminants of concern. These could include waste removal or engineered covers over source material along with consolidation and grading.
- Temporary or permanent engineered sediment controls such as: subsurface drains, earthen dikes, straw bale dikes, silt fences, brush barriers, drainage swales, check dams, pipe slope drains, rock outlet protection, sediment traps, manhole sumps, retaining walls, drop structures, or filter strips.
- Curb and gutters to channel run-on and runoff away from source areas.
- Detention/retention basins within storm water drainage basins to reduce (detention) or capture (retention) storm flows and reduce suspended sediment loads from defined precipitation events. Monitoring will be used to determine optimum holding times for suspended load reduction.
- Routing of storm flows away from receiving surface water (i.e., to the Berkeley Pit or to isolated areas or sedimentation basins).
- Removing source materials to a repository.

If BMPs are not effective in achieving surface water quality standards in Silver Bow Creek within a reasonable time frame, lime treatment of storm water runoff will be required. Following the implementation of the remedy, EPA will evaluate the performance of the surface water management and BMP program periodically as part of the five-year review process required by the NCP. Annual storm water compliance analyses will be reviewed every 5 years and compared against past data to identify trends and compared against action levels (DEQ-7 acute aquatic life standards) to assess the magnitude of exceedances. EPA, in consultation with DEQ, will consider data trends and the magnitude of exceedances observed to assess the likelihood that additional BMPs will continue to decrease contaminant loading during wet weather runoff conditions to the point where action levels will be achieved. If EPA determines that further BMPs will not effectively achieve action levels, the RP Group will be directed to begin capturing and treating storm water runoff to the extent practicable. Existing detention/retention basins may be used to capture and store storm water for treatment. To provide ample time for BMPs to be implemented and evaluated for effectiveness, the phased BMP program will be operated through at least two consecutive five-year review cycles or 10 years. Also, a maximum period of 15 years



will be permitted for the phased BMP approach to achieve action levels (DEQ-7 acute aquatic life criteria) before storm water treatment is required.

An evaluation of the amount of storm water that could practicably be treated shall be performed during design. Storm flows up to the maximum practicable design criterion would then be collected and treated by lime precipitation technology. If treatment is required, a conventional lime treatment plant will be constructed for this purpose.

As described in the Solid Media Components, EPA has consulted with the State and other parties to identify appropriate "upfront" BMPs as an initial phase of this portion of the remedy. Sites that have been identified for implementing initial BMPs under the Selected Remedy are listed in Unreclaimed Source Areas Not Exceeding Action Levels, Section 12.3.1.2.

#### **12.3.3.2 Sediment Removal from Blacktail and Silver Bow Creek Channels**

Elevated arsenic and metals occur in streambed sediments, the stream banks, and nearby floodplain from Blacktail Creek just above the confluence and through Silver Bow Creek to Lower Area One. The Selected Remedy shall require excavation of contaminated sediment, stream banks, and floodplain wastes from the reach of Blacktail Creek just above the confluence with Metro Storm Drain down to the reconstructed floodplain and stream channel in Lower Area One.

Excavated sediments and other wastes shall be hauled and placed in the Butte Mine Waste Repository or other appropriate EPA-approved disposal site. Contaminated sediments, stream banks, and nearby floodplain wastes and contaminated soils will be removed to minimize impacts to surface water quality. The streambed, stream channel and associated floodplains will be reconstructed in a manner that minimizes the potential for groundwater to discharge to surface water, and planted with appropriate grasses, forbs, trees and shrubs. The stream and floodplain will be reconstructed according to an EPA-approved design.

Following removal of the in-stream sediments, further evaluation of surface water quality in this area will be conducted. If groundwater inflow is found to adversely affect surface water quality, additional hydraulic controls and groundwater capture shall be implemented.

#### **12.3.3.3 Surface Water Management for Base Flow Remediation**

During base flow conditions, the discharge of contaminated groundwater to surface water is the primary cause of metals and arsenic contamination in Silver Bow Creek. The groundwater component of the Selected Remedy will be the primary remedial action in addressing surface water contamination during base flow conditions (see Section 12.3.2). This has been clearly demonstrated by the groundwater controls that have been implemented at Lower Area One. As was discussed in Section 5, there has been an order of magnitude improvement in surface water quality in Silver Bow Creek since contaminated groundwater has been prevented from discharging to Silver Bow Creek (see Figure 5-19). The groundwater controls that the Selected Remedy



requires for Metro Storm Drain will provide additional protection of surface waters in Silver Bow and Blacktail Creeks. If groundwater that is not captured by the existing LAO and MSD capture systems is found to discharge to surface water and adversely affect surface water quality, additional appropriate hydraulic controls and groundwater capture shall be implemented.

The BMPs implemented as part of the Selected Remedy for storm water will also benefit water quality during base flow. Finally, the removal of sediments from Silver Bow Creek and Blacktail Creek as described in Section 12.3.3.3 is part of the Selected Remedy for protecting surface water during base flow conditions.

#### **12.3.3.4 In-Stream Flow Augmentation**

The Selected Remedy may include the addition of off-site source water if necessary to supplement surface water remedial components to improve the flow and quality characteristics of the water within Silver Bow Creek. However, flow augmentation will not be considered until the major remedial components described in this ROD are designed and implemented. If after major remedial components are implemented, the receiving water is not meeting performance standards, and more improvement to water quality is considered by EPA to be necessary and appropriate, then in-stream flow augmentation may be used. Administrative authorizations will be needed from the Montana Department of Natural Resources and Conservation for water use, per the Montana Water Use Act. Specific engineering evaluations will be performed during design to determine appropriate locations, flow volume modifications, and conveyance channel or culvert sizes and slopes.

#### **12.3.4 Role of Institutional Controls in the Selected Remedy**

ICs are non-engineering tools that are integral components of the overall remedy for the OU. ICs serve to protect the response actions (past and future) from degradation. For groundwater, ICs limit use of the resource in order to prevent the public from unacceptable levels of exposure to COCs.

The specific ICs to be used at the site may include some or all of the following: local government use and permitting requirements; Montana floodplain regulations; restrictive covenants; environmental control easements; conservation easements; local zoning; dedicated developments; public groundwater controls; information devices; and enforcement and permit tools with institutional components. A summary of the basic types of ICs and the specific ICs to be used at the site is presented below.

##### ***Basic Types of ICs***

ICs to be used at the OU were chosen from four basic categories:

- **Governmental.** Significant governmental controls, similar to those used to operate and manage urban areas throughout the country, are already in effect within the BPSOU. BSB currently regulates land use through its zoning regulations and uses the Guidebook for Reclaimed Areas in connection with developing reclaimed areas. State Law requires floodplain regulations and local ordinances must be at least as restrictive



as the State's requirements. These regulations limit the allowable land uses and types of development that can occur to land uses that are consistent and compatible with the technical remedy. The BSB planning office, which administers the building permitting process, enforces these regulations.

- **Proprietary.** These are measures that may be implemented by a landowner by the executing and recording in the county public records an instrument transferring the property or certain interests in the property subject to restrictions and/or affirmative obligations. These restrictions and/or affirmative obligations are in the chain of title to the property and are binding on subsequent landowners. These proprietary ICs may be either private, when the rights or interests are held by a private party, or combination, when the rights or interests are held by a governmental entity or have some potential or actual governmental involvement. They include restrictive covenants, easements, conservation easements, and environmental control easements. Restrictive covenants and easements generally are between private parties and are thus considered "private" forms of proprietary measures. Conservation easements and environmental control easements may be held by either a governmental entity or a statutorily determined "qualified" private entity and may require (in the case of environmental control easements) governmental approval.
- **Informational Devices.** Tools that provide information or notification that residual or capped contamination may remain on site constitute an IC. Such tools already established by BSB County, in cooperation with Atlantic Richfield, include the Blood Lead Poisoning and Abatement Program and a geographical information system.
- **Enforcement and Permit Tools with Institutional Components.** EPA has authority to issue or negotiate UAOs and AOCs to compel the landowner to limit or require certain activities on Federal lands and to issue or negotiate UAOs, AOCs, and consent decrees with respect to private lands. Through the use of such tools, EPA may allocate responsibility among RPs and designate primary and secondary parties.

#### ***ICs Specified as Part of the Selected Remedy at the OU***

The ICs specified for the OU were created by combining appropriate elements of the categories of ICs listed above, considering both short- and long-term effectiveness. At a minimum, they will include:

- **Controlled Groundwater Area.** A controlled groundwater area will be established in the Alluvial Aquifer TI Zone to prevent domestic use of contaminated water, exacerbation or spreading of existing contamination, or release of highly contaminated groundwater to surface water resources through irrigation. The controlled groundwater area will prevent new well development, except for CERCLA monitoring wells, well systems that treat contaminated water prior to use, and the use of existing domestic and commercial wells. To the extent a controlled groundwater area will not prevent the use of existing wells, an education and well abandonment program will be implemented to persuade owners not to use contaminated water and to voluntarily take existing wells out of service in exchange, for example, for being hooked up to



public water. An administrative entity will be identified under RD/RA to monitor and enforce these restrictions.

- **County zoning and permit requirements.** County zoning and permit requirements will be implemented to ensure that capped waste areas, discrete areas of waste left in place, and other control measures such as storm water controls are not disturbed, mismanaged, or inappropriately developed and that waste taken from these areas is disposed of at the Butte Mine Waste Repository, or if identified as a hazardous waste disposed of at a RCRA C facility. These controls and permits are best implemented with adequate funding for appropriate redevelopment and re-use of affected sites.
- **Deed Notices.** Deed notices will be required for all areas where wastes were capped and left in place or where engineered controls were constructed or other discrete wastes were left in place. The deed notices will notify current and subsequent landowners of the presence of these wastes or engineered controls and ensure that these wastes are not disturbed. In addition, fencing and signs may be required to ensure the integrity of caps and engineered controls.
- **Fencing and Posting.** Where private landowners require fencing or use posting for legitimate reasons relating to prevention of remedy disruption, the Selected Remedy requires the installation of these fences or signs. As noted above, EPA encourages redevelopment and reuse where possible, but that is not always compatible with a landowner's legitimate use plans at a given site.

Zoning and permit requirements are likely to be implemented by Butte Silver Bow County.

EPA will work with the county and responsible parties to ensure that workable and adequate zoning controls and permit requirements are enacted and enforced. This will require funding for the county, and the funding issue will have to be addressed in any enforcement action for this ROD. The controlled groundwater area has been developed by the local water district with funding from the responsible parties, and efforts to finalize and submit the application for a controlled groundwater area to the State Department of Natural Resources, and enforcement of the ban once enacted, will require additional funding. Deed notices are an issue that responsible parties and Butte Silver Bow County will need to work on cooperatively with all affected landowners. Fences and signs are actions that can be taken by the responsible parties which implement the remedy, again in cooperation with local landowners.

## 12.4 Estimated Cost of the Selected Remedy

A summary of the capital and operations and maintenance costs for the Selected Remedy is provided in Tables 12-3 through 12-9. Costs were derived from the final FS, along with appropriate changes to reflect costs of the expanded BPSOU Residential Metals Abatement Program and upgrades to the storm sewer system. Capital costs are summarized for solid media, groundwater, and surface water in Tables 12-3, 12-4, and 12-5. Annual O&M costs for solid media, groundwater, and surface water are summarized in Tables 12-6, 12-7, and 12-8. Capital and O&M costs for institutional



controls (site wide) are summarized in Table 12-9. Detailed cost backup is provided in Appendix F of the Final FS. Present value analyses are incorporated into the individual tables, where appropriate. The present value analysis was carried forward for 100 years at a discount rate of three percent. Costs for each media in the Selected Remedy were then calculated. These media-specific capital costs and O&M costs were compiled into a cost summary table presented in Table 12-10.

The cost estimate differs from the estimate in the proposed plan. Capital costs were first escalated by a factor of 17.4 percent to reflect inflation in the construction industry from 2004 (FS costs are 2004 costs) to 2006 (USACE 2006). Then, a discount factor of three percent was used in the present value analysis instead of seven percent. A three percent discount factor is used in this ROD because it reflects more realistic investment return and inflation conditions. The cost estimation guidance allows the use of other interest (discount) rates as published by the Office of Management and Budget (OMB). The 30-year real interest rate is three percent, and OMB allows that rate for programs that will have a duration longer than 30 years (OMB Circular No. A-94, January 2006).

A 100-year period of analysis was selected because at a discount rate of 3 percent, the incremental present worth cost beyond this time becomes insignificant. The discount factor at 100 years is 0.052. For example, if a cost of \$1,000,000 were anticipated in year 100, the present value of this cost would only be \$52,000. When comparing alternative costs in the tens or hundreds of millions of dollars, these costs are insignificant by comparison. However, even though costs are estimated for 100-year duration, this should not be confused with the actual project duration. For example, groundwater treatment alternatives will be required well beyond 100 years, if not in perpetuity.

The present value of the estimated cost of the Selected Remedy is approximately \$110 to \$157 million (Table 12-10). The range in costs reflects the potential need to build and operate a treatment plant for storm water, in the event that BMPs alone are not effective in achieving water quality standards in Silver Bow Creek. For cost estimation purposes, it was assumed that this decision regarding storm water treatment would be made after about 10 years. The time frame to implement the majority of the components of the Selected Remedy is about 15 years; however, O&M activities will be carried forward in perpetuity.

These cost estimates are based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during engineering design. This is an order of magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.



**Table 12-3**  
**Summary of Capital Costs for Selected Remedy - Solid Media**  
Record of Decision  
Butte Priority Soils Operable Unit  
Silver Bow Creek/Butte Area NPL Site

Item	Notes	Start Year	End Year	FS or PP Cost	Escalation (2004 to 2006) <sup>h</sup>	Unit Cost	Annual Quantity	Total Cost per Year <sup>d</sup>	Discount Factor at 3% <sup>b</sup>	Present Value <sup>g</sup>
<b>Covers in Mine Waste Areas</b> (areas exceeding lead and/or arsenic action levels needing to be reclaimed)	I-3, a,b,c,d,h	0	1	\$30,800/acre	1.174	\$36,160/acre <sup>d</sup>	13.25 acres <sup>a</sup>	\$ 691,838	0.971	\$ 1,363,613
<b>Granite Mountain Memorial Area</b>	I-10, b,c,h	0	1			--	--	\$ 1,198,634	0.971	\$ 2,362,508
<b>Syndicate Pit</b>	I-6 c,h	0	0	\$ 144,491	1.174	--	--	\$ 169,632	--	\$ 169,632
<b>Mine Waste Repository Closure</b>	I-16 c,h	0	0	\$ 202,007	1.174	--	--	\$ 237,156	--	\$ 237,156
<b>Residential Metals</b>										
Yard Sampling and Remediation	I-13, c,e,g,h	0	14	\$12,300/house	1.174	\$14,440/ house	94	\$ 1,357,360	11.296	\$ 16,690,099
Multi-Pathway/Attic Dust/ Medical Monitoring - first 15 years	I-14, c,f,g,h	0	14	\$15,400/house	1.174	\$18,080/house	56	\$ 1,012,480	11.296	\$ 12,449,454
Multi-Pathway/Attic Dust/ Medical Monitoring - after 15 years	I-14, c,f,h,i	15	99			\$2,000/house	3	\$ 6,000	20.251	\$ 121,506
<b>TOTAL PRESENT VALUE CAPITAL COSTS - SOLID MEDIA</b>										<b>\$ 33,390,000</b>

**Notes:**

3% discount factor used for Present Value Calculations. Although EPA guidance uses a 7% discount factor for present value calculations, a 3% figure is used in this ROD because it reflects more realistic investment return and inflation conditions. The FS guidance allows the use of other interest (discount) rates as published by the Office of Management and Budget (OMB). The 30-year real interest rate is 3%, and OMB allows that rate for programs that will have a duration longer than 30 years (OMB Circular No. A-94, January 2006).

2004 Costs from the Final FS involving construction activities were escalated to 2006 costs by an index of 17.4 percent. Factor obtained from March 2006 US Army Corps of Engineers Civil Works Construction Cost Index System (USACE CWCCIS) for time period between first quarter fiscal year 2004 to fourth quarter fiscal year 2006 (pages A-17 and A-18).

Notes referencing "I-X" are referring to specific cost tables in the Final FS from 2004.

FS or PP Cost refers to costs as presented in the Final Feasibility Study or Proposed Plan.

Burden and profits included in unit costs.

a. Construction expected to take two years - remaining acreage 27.5 acres, assumed 2 year duration to complete reclamation, total cost divided in half.

b. Construction expected to take two years - total cost for Granite Mountain Memorial Area from FS divided in half.

c. Total Cost represents estimated annual costs and includes direct and indirect costs, contingency, remedial design, and construction management.

d. Unit cost per acre back-calculated from Table I-3 in FS and represents a variety of cover types, but does not include mobilization/demobilization, contingencies, design, etc. The total cost presented above includes these additional indirect costs, but calculation of these costs is not presented in the table.

e. Differs from the Final FS Costs. Assumed 44% of BPSOU properties exceed solid media RGs (see Section 5.2.1.)  $0.44 \times 3,200 = 1,408$  requiring remediation (see Section 12.3.1.1). Assumed 94 properties per year would need abatement to meet the 15-year timeframe ( $1,408/15=94$ ). Unit cost based on actual program costs provided by BSB for sampling and remediation, escalated 17.4 percent from 2004 to 2006.

f. Per BSB, 59% of properties needing yard abatements also need house abatements (59% of 1,408 = 831 properties, over 15 years = 56 properties/year). Also partially accounts for medical monitoring and attic dust abatements. Assumed 3 houses per year are abated for attic dust only (\$2,000/house) after the 15 year abatement period through year 99.

g. Present Value cost = total cost per year + total cost per year x discount factor. In this way, year zero is not discounted.

h. Costs from 2004 FS escalated to 2006 costs by factor of 17.4 percent (USACE 2006).

i. Discount factor = Year 99-Year 14 ( $31.4569-11.2961$ ).



Table 12-4

**Summary of Capital Costs for Selected Remedy - Groundwater**  
**Record of Decision**  
**Butte Priority Soils Operable Unit**  
**Silver Bow Creek/Butte Area NPL Site**

Item	Notes	Start & End Years	Quantity	FS or PP Cost	Escalation (2004 to 2006) <sup>c</sup>	Total Cost	Discount Factor at 3%	Present Value
<b>Groundwater Collection System Components</b>								
MSD Collection and Conveyance	I-23, c			\$ 187,720	1.174	\$ 220,383		
LAO Collection and Conveyance - modifications	I-23, c			\$ 4,000	1.174	\$ 4,696		
<b>Treatment Lagoon Components</b>								
Treatment Lagoon Equipment Subtotal	I-23, c			\$ 518,220	1.174	\$ 608,390		
<b>Direct Construction Subtotal</b>						<b>\$ 833,469</b>		
Mobilization/Demobilization	I-23		5%			\$ 41,673		
Water/Sediment Control	I-23		5%			\$ 41,673		
<b>Indirect Construction Subtotal</b>						<b>\$ 83,347</b>		
Contingency (10% Bid, 5% Scope)	I-23		15%			\$ 137,522		
<b>Construction Subtotal</b>						<b>\$ 1,054,338</b>		
Remedial Design	I-23, e		10%			\$ 105,434		
Construction Management	I-23		5%			\$ 52,717		
<b>Groundwater Collection and Treatment Total</b>						<b>\$ 1,212,489</b>		
Cost per year (assume 3 years)	a, f	0-2				\$ 404,163	1.913	\$ 1,177,327
<b>Reclamation of Ball Fields and Wetland Demonstration Area</b>								
Wetland Demonstration Area Reclamation	I-3, b		6.7 Acres	\$ 206,360	1.174	\$ 242,267		
Ball Fields Reclamation	I-3, b		11 Acres	\$ 338,800	1.174	\$ 397,751		
<b>Direct Construction Subtotal</b>						<b>\$ 640,018</b>		
Mobilization/Demobilization	I-3		5%			\$ 32,001		
Water/Sediment Control	I-3		5%			\$ 32,001		
<b>Indirect Construction Subtotal</b>						<b>\$ 64,002</b>		
Contingency (10% Bid, 5% Scope)	I-3		15%			\$ 105,603		
<b>Construction Subtotal</b>						<b>\$ 809,623</b>		
Remedial Design	I-3		5%			\$ 40,481		
Construction Management	I-3		5%			\$ 40,481		
<b>Reclamation Total</b>						<b>\$ 890,585</b>		
Cost per year (assume 3 years)	a, f	0-2				\$ 296,862	1.913	\$ 864,759
<b>Saturated Solid Media Managed in Place</b>								
Saturated Solid Media Managed in Place	I-29	0				\$ 20,000		\$ 20,000
<b>Groundwater Monitoring Program Setup</b>								
Install Groundwater Monitoring Wells (assume 30 wells, avg. 30 feet deep each for costing, \$75/ft)	g	0	30 wells			\$ 67,500		
Personnel (2 FTE, 3 weeks, 40 hour week, \$50/hour)	g	0	240 hours			\$ 12,000		
MSD Pump Test (2 FTE, 40 hour week, \$50/hour)	g	0	80 hours			\$ 4,000		
Pump Test Equipment	g	0				\$ 1,000		
Pump Test Report	g	0				\$ 20,000		
MSD Subdrain Tracer Test (2 FTE, 40 hour week, \$50/hour)	g	0	80 hours			\$ 4,000		
Tracer Test equipment	g	0				\$ 2,000		
Analytical (20 samples, \$100/sample)	g	0				\$ 2,000		
Tracer Test Report	g	0				\$ 20,000		
Develop GW Monitoring Plan						\$ 25,000		
<b>Groundwater Monitoring Program Subtotal</b>		0				<b>\$ 157,500</b>	--	<b>\$ 157,500</b>
<b>TOTAL PRESENT VALUE CAPITAL COSTS - GROUNDWATER</b>								<b>\$ 2,220,000</b>

**Notes:**

3% discount factor used for Present Value Calculations. Although EPA guidance uses a 7% discount factor for present value calculations, a 3% figure is used in this ROD because it reflects more realistic investment return and inflation conditions. The FS guidance allows the use of other interest (discount) rates as published by the Office of Management and Budget (OMB). The 30-year real interest rate is 3%, and OMB allows that rate for programs that will have a duration longer than 30 years (OMB Circular No. A-94, January 2006).

2004 Costs from the Final FS involving construction activities were escalated to 2006 costs by an index of 17.4 percent. Factor obtained from March 2006 US Army Corps of Engineers Civil Works Construction Cost Index System (USACE CWCCIS) for time period between first quarter fiscal year 2004 to fourth quarter fiscal year 2006 (pages A-17 and A-18).

Burden and profits included in unit costs.

Notes referencing "I-X" are referring to specific cost tables in the Final FS.

FS or PP Costs refers to original costs as presented in the Final Feasibility Study or Proposed Plan.

a. Construction expected to take three years, total cost divided by three.

b. Cost of reclamation per acre based on FS table I-3, Construction Subtotal of \$847,416/27.5 acres = \$30,800 per acre, escalated 17.4%=\$36,160.

c. Costs from 2004 FS escalated to 2006 costs by factor of 17.4 percent (USACE 2006).

d. FTE = Full Time Employee

e. Remedial design costs increased from 5% to 10% due to shakedown period evaluation and potential re-design issues.

f. Present Value cost = total cost per year + total cost per year x discount factor. In this way, year zero is not discounted.

g. Groundwater Monitoring Program estimates based on description in Section 12 and professional judgement.



Table 12-5

## Summary of Capital Costs for Selected Remedy - Surface Water

Record of Decision  
Butte Priority Soils Operable Unit  
Silver Bow Creek/Butte Area NPL Site

Item	Notes	Start and End Years	FS or PP Cost	Escalation (2004 to 2006)*	Unit Cost	Quantity	Total Cost	Discount Factor at 3%	Present Value
<b>BMP Program Costs</b>									
Warren Avenue	I-17, a,e		\$ 131,697	1.174			\$ 154,612		
Anaconda Road/Butte Brewery	I-17, a,e		\$ 66,174	1.174			\$ 77,688		
Buffalo Gulch	I-17, a,e		\$ 415,000	1.174			\$ 487,210		
Metro Storm Drain	I-17, a,e		\$ 993,420	1.174			\$ 1,166,275		
Missoula Gulch	I-17, a,e		\$ 537,600	1.174			\$ 631,142		
Lower Area One/Butte Reduction Works	I-17, a,e		\$ 169,720	1.174			\$ 199,251		
Grove Gulch	I-17, a,e		\$ 101,037	1.174			\$ 118,617		
Blacktail Creek	I-17, a,e		\$ 115,185	1.174			\$ 135,227		
Silver Bow Creek	I-17, a,e		\$ 190,704	1.174			\$ 223,886		
Site Wide Storm Sewer Upgrade					\$75/ft	40 miles	\$ 15,840,000		
<b>BMP Program Costs - Subtotal</b>							<b>\$ 19,033,908</b>		
Contingency (10% Bid, 5% Scope)	I-17					15%	\$ 2,855,086		
<b>Construction Subtotal</b>							<b>\$ 21,888,994</b>		
Remedial Design	I-17					5%	\$ 1,094,450		
Construction Management	I-17					5%	\$ 1,094,450		
<b>BMP Program Total</b>							<b>\$ 24,077,894</b>		
Cost per year (assume 10 years)	c,f	0-9					\$ 2,407,789	7.786	\$ 21,154,834
<b>Purchase ISCO Surface Water Monitors</b>									
Contingency (10% Bid, 0% Scope)			\$ 3,500	1.174	\$4,109	6	\$ 24,654		
<b>ISCO Equipment Total</b>		0-0				10%	\$ 2,465		
							\$ 27,119	--	\$ 27,119
<b>Silver Bow Creek Sediment Removal:</b>									
		0-0					\$ 280,000	--	\$ 280,000
<b>Storm Water Treatment Plant Components (if necessary)</b>									
Collection and Conveyance System	I-19 e		\$ 2,416,804	1.174			\$ 2,837,328		
Lime Plant Equipment Subtotal	I-19 e		\$ 6,951,080	1.174			\$ 8,160,568		
Lime Plant System & Improvements Subtotal	I-19 e		\$ 3,684,072	1.174			\$ 4,325,101		
<b>Direct Construction Subtotal</b>							<b>\$ 15,322,997</b>		
Mobilization/Demobilization	I-19					5%	\$ 766,150		
Water/Sediment Control	I-19					5%	\$ 766,150		
<b>Indirect Construction Subtotal</b>							<b>\$ 1,532,300</b>		
Contingency (10% Bid, 10% Scope)	I-19					20%	\$ 3,371,059		
<b>Construction Subtotal</b>							<b>\$ 20,226,356</b>		
Remedial Design	I-19					5%	\$ 1,011,318		
Construction Management	I-19					5%	\$ 1,011,318		
<b>Storm Water Treatment Plant Total (if necessary)</b>							<b>\$ 22,248,992</b>		
Cost per year (assume 3 years)	c	10-12					\$ 7,416,331	2.175	\$ 16,130,520
<b>TOTAL PRESENT VALUE CAPITAL COSTS (Low Range)</b>									
	d								\$ 21,460,000
<b>TOTAL PRESENT VALUE CAPITAL COSTS (High Range)</b>									
	d								\$ 37,590,000

## Notes:

3% discount factor used for Present Value Calculations. Although EPA guidance uses a 7% discount factor for present value calculations, a 3% figure is used in this ROD because it reflects more realistic investment return and inflation conditions. The FS guidance allows the use of other interest (discount) rates as published by the Office of Management and Budget (OMB). The 30-year real interest rate is 3%, and OMB allows that rate for programs that will have a duration longer than 30 years (Circular No. A-94, January 2006).

2004 Costs from the Final FS involving construction activities were escalated to 2006 costs by an index of 17.4 percent. Factor obtained from March 2006 US Army Corps of Engineers Civil Works Construction Cost Index System (USACE CWCIS) for time period between first quarter fiscal year 2004 to fourth quarter fiscal year 2006 (pages A-17 and A-18).

Burden and profits included in unit costs.

Notes referencing "I-X" are referring to specific cost tables in the Final FS.

FS or PP Costs refers to original costs as presented in the Final Feasibility Study or Proposed Plan.

a. BMP Costs estimated by acreage and engineering judgement as to what may be needed and what can be built in each drainage. See Attachment D of Appendix I of FS.

b. Volume estimate assumes 1,200 feet length x 15 feet width x 1 ft depth.

c. Total cost divided by 10 years for BMP Program and 3 years for storm water treatment plant.

d. Low range cost does not include storm water treatment, while high range costs include storm water treatment in a conventional lime treatment plant.

e. Costs from 2004 FS escalated to 2006 costs by factor of 17.4 percent (USACE 2006).

f. Present Value cost = total cost per year + total cost per year x discount factor. In this way, year zero is not discounted.



**Table 12-6**  
**Summary of O&M Costs for Selected Remedy - Solid Media**  
**Record of Decision**  
*Butte Priority Soils Operable Unit*  
*Silver Bow Creek/Butte Area NPL Site*

Item	Notes	Start and End Years	Quantity	FS or PP Cost	Escalation (2004 to 2006) <sup>d</sup>	Unit Cost	Total Cost per Year <sup>a</sup>	Discount Factor at 3%	Present Value
<b>Source Area O&amp;M - Completed Reclamation</b>	I-1, d		422 Acres	\$300/acre	1.174	\$352/acre	\$ 148,544		
Contingency (10% Scope, 5% Bid)	I-1, I-3		15%				\$ 22,282		
<b>Subtotal</b>		1-99					\$ 170,826	31.547	\$ 5,389,048
<b>Source Area O&amp;M - New Reclamation</b>	I-3, d	2-99	27.5 Acres	\$300/acre	1.174	\$352/acre	\$ 9,680		
Contingency (10% Scope, 5% Bid)	I-1, I-3		15%				\$ 1,452		
<b>Subtotal</b>		2-99					\$ 11,132	30.576	\$ 340,372
<b>BRES Program Costs</b>	I-1, c	1-99	1.5 FTE			\$ 93,600	\$ 140,400	31.547	\$ 4,429,199
<b>Complete Reclamation Repair</b>	I-3, d,e	50	25	\$30,800/acre	1.174	\$ 36,160	\$ 904,000		
Contingency (10% Scope, 5% Bid)			15%				\$ 135,600		
<b>Subtotal</b>							\$ 1,039,600	0.228	\$ 237,029
<b>Source Area O&amp;M Total</b>									\$ 10,395,648
<b>Granite Mountain Memorial Area (includes contingency)</b>	I-10	2-99	40 Acres	\$300/acre	1.174	\$352/acre	\$ 14,080	30.576	\$ 430,510
<b>Syndicate Pit (includes contingency)</b>	I-6	1-99	4 Acres	\$300/acre	1.174	\$352/acre	\$ 1,408	31.547	\$ 44,418
<b>Residential Metals</b>	b						\$ -		
<b>Mine Waste Repository</b>	I-16	1-99	4.4 Acres	\$300/acre	1.174	\$352/acre	\$ 1,549	31.547	\$ 48,866
<b>TOTAL ANNUAL O&amp;M COSTS - SOLID MEDIA</b>									<b>\$ 10,920,000</b>

**Notes:**

3% discount factor used for Present Value Calculations. Although EPA guidance uses a 7% discount factor for present value calculations, a 3% figure is used in this ROD because it reflects more realistic investment return and inflation conditions. The FS guidance allows the use of other interest (discount) rates as published by the Office of Management and Budget (OMB). The 30-year real interest rate is 3%, and OMB allows that rate for programs that will have a duration longer than 30 years (OMB Circular No. A-94, January 2006).

2004 Costs from the Final FS involving construction activities were escalated to 2006 costs by an index of 17.4 percent. Factor obtained from March 2006 US Army Corps of Engineers Civil Works Construction Cost Index System (USACE CWCCIS) for time period between first quarter fiscal year 2004 to fourth quarter fiscal year 2006 (pages A-17 and A-18).

Burden and profits included in unit costs.

Notes referencing "I-X" are referring to specific cost tables in the Final FS.

FS or PP Costs refers to original costs as presented in the Final Feasibility Study or Proposed Plan.

a. Total Cost represents estimated annual costs.

b. Residential Metals program O&M costs accounted for with capital costs in Table 12-3.

c. FTE = Full Time Employee.

d. Costs from 2004 FS escalated to 2006 costs by factor of 17.4 percent (USACE 2006).

e. Assumption for scenario that previous reclamation fails and needs to be completely redone. Assumed 5 percent of all reclaimed acreage (422+27.5+40+4+4.4 acres) would be reclaimed again in year 50.



**Table 12-7**  
**Summary of O&M Costs for Selected Remedy - Groundwater**

Record of Decision  
Butte Priority Soils Operable Unit  
Silver Bow Creek/Butte Area NPL Site

Item	Notes	Start and End Years	Quantity	FS or PP Cost	Escalation (2004 to 2006) <sup>a</sup>	Unit Cost	Total Cost	Discount Factor at 3%	Present Value
<b>Annual Groundwater Treatment Costs</b>									
Lime	I-1, I-23, b		378 tons	\$100/ton	1.174	\$117/ton	\$ 44,226		
Staff (1 operator @ \$64,800/yr)	I-23						\$ 64,800		
Effluent Quality Testing	I-24						\$ 30,000		
Annual Monitoring Reports	I-24						\$ 30,000		
Repair/Replace Equipment	I-23 g		5% capital cost		—		\$ 58,866		
Sludge Removal/Disposal	I-1, I-23, b			\$ 50,000	1.174		\$ 58,700		
Electrical/Utilities	I-23, b		1 Year	\$ 25,000	1.174	\$ 29,350	\$ 29,350		
<b>Subtotal</b>							<b>\$ 315,942</b>		
Contingency (5% Scope, 10% Bid)	I-24		15%				\$ 47,391		
<b>Treatment Lagoons O&amp;M Total</b>		1-99					<b>\$ 363,333</b>	31.547	<b>\$ 11,462,066</b>
<b>Saturated Solid Media Managed in Place</b>	I-29	1-99					<b>\$ 2,500</b>	31.547	<b>\$ 78,868</b>
<b>Reclaimed Ball Fields and Wetland Area O&amp;M</b>	I-3, b	3-99	17.7 acres	\$300/acre	1.174	\$352/acre	<b>\$ 6,230</b>	28.663	<b>\$ 178,570</b>
<b>Groundwater Monitoring</b>									
Monthly Water Levels (subset)	c,d								
Personnel (1 FTE, 1 day, \$50/hour)			10 months			\$ 400	\$ 4,000		
Bi-Annual Water Levels (all wells)									
Personnel (1 FTE, 2 days, \$50/hour)			2 months			\$ 800	\$ 1,600		
Annual Sampling									
Personnel (2 FTE, 3 days, \$50/hour)			1 event			\$ 2,400	\$ 2,400		
Equipment Costs							\$ 500		
Analytical Costs (30 samples, \$100/sample)			30 samples			\$ 100	\$ 3,000		
Annual Groundwater Monitoring Reports							\$ 30,000		
<b>Subtotal</b>							<b>\$ 41,500</b>		
Contingency (10% scope, 5% bid)						15%	\$ 6,225		
<b>Groundwater Monitoring Total</b>	f	0-99					<b>\$ 47,725</b>	31.547	<b>\$ 1,553,306</b>
<b>TOTAL O&amp;M COSTS</b>									<b>\$ 13,270,000</b>

**Notes:**

3% discount factor used for Present Value Calculations. Although EPA guidance uses a 7% discount factor for present value calculations, a 3% figure is used in this ROD because it reflects more realistic investment return and inflation conditions. The FS guidance allows the use of other interest (discount) rates as published by the Office of Management and Budget (OMB). The 30-year real interest rate is 3%, and OMB allows that rate for programs that will have a duration longer than 30 years (OMB Circular No. A-94, January 2006).

2004 Costs from the Final FS involving construction activities were escalated to 2006 costs by an index of 17.4 percent. Factor obtained from March 2006 US Army Corps of Engineers Civil Works Construction Cost Index System (USACE CWCCIS) for time period between first quarter fiscal year 2004 to fourth quarter fiscal year 2006 (pages A-17 and A-18).

Notes referencing "I-X" are referring to specific cost tables in the Final FS.

FS or PP Costs refers to original costs as presented in the Final Feasibility Study or Proposed Plan.

a. Cost approximate based on sludge management pilot testing at treatment lagoons in 2005.

b. Costs from 2004 FS escalated to 2006 costs by factor of 17.4 percent (USACE 2006).

c. Groundwater monitoring costs developed from preliminary monitoring plan outline in Section 12 and judgement. Periodic sampling of all wells every 5 years will occur, however, the cost of the additional effort to sample and report on all wells versus a subset of wells is not significant because the largest cost is the reporting.

d. Groundwater monitoring will include periodic sampling of all wells every 5 years. However, for this cost estimate, the additional effort to sample and report on all wells versus a subset of wells is not significant.

f. Present Value cost = total cost per year + total cost per year x discount factor. In this way, year zero is not discounted.

g. Cost for equipment replacement 5% of capital cost from Table 12-4, which already includes escalation from 2004 to 2006.



**Table 12-8**  
**Summary of O&M Costs for Selected Remedy - Surface Water**  
**Record of Decision**  
*Butte Priority Soils Operable Unit*  
*Silver Bow Creek/Butte Area NPL Site*

Item	Notes	Start and End Years	FS or PP Cost	Escalation (2004 to 2006) <sup>c</sup>	Quantity	Total Cost	Discount Factor at 3%	Present Value
Storm Water TCRA O&M	I-1	1-99	\$ 53,000	1.174		\$ 62,222	31.547	\$ 1,962,917
Surface Water Monitoring	I-1	1-99				\$ 150,000	31.547	\$ 4,732,050
BMP Program								
BMP Program O&M (Years 1-5)	I-17, a		\$ 383,200	1.174		\$ 449,877		
Contingency (15% Scope, 5% Bid)					20%	\$ 89,975		
<b>Subtotal</b>		1-4				\$ 539,852	3.717	\$ 2,006,630
BMP Program O&M (After Year 5)	I-17, a		\$ 484,100	1.174		\$ 568,333		
Contingency (15% Scope, 5% Bid)					20%	\$ 113,667		
<b>Subtotal</b>		5-99				\$ 682,000	27.830	\$ 18,980,060
<b>Surface Water O&amp;M Total</b>								<b>\$ 27,680,000</b>
Storm Water Treatment Plant (if necessary)								
Storm Water Collection and Conveyance	I-19, c		\$ 55,400	1.174		\$ 65,040		
Treatment Plant Operation (lime, staff, utilities, sludge management, monitoring, etc.)	I-19, c		\$ 960,854	1.174		\$ 1,128,043		
<b>Subtotal</b>						\$ 1,193,083		
Contingency (10% scope, 10% bid)	I-19				20%	\$ 238,617		
<b>Storm Water Treatment Plant O&amp;M Total (if necessary)</b>	I-19	13-99				\$ 1,431,700	21.593	\$ 30,914,698
<b>TOTAL ANNUAL O&amp;M COSTS (Low Range)</b>								<b>\$ 27,680,000</b>
<b>TOTAL ANNUAL O&amp;M COSTS (High Range)</b>								<b>\$ 58,590,000</b>

**Notes:**

3% discount factor used for Present Value Calculations. Although EPA guidance uses a 7% discount factor for present value calculations, a 3% figure is used in this ROD because it reflects more realistic investment return and inflation conditions. The FS guidance allows the use of other interest (discount) rates as published by the Office of Management and Budget (OMB). The 30-year real interest rate is 3%, and OMB allows that rate for programs that will have a duration longer than 30 years (OMB Circular No. A-94, January 2006).

2004 Costs from the Final FS involving construction activities were escalated to 2006 costs by an index of 17.4 percent. Factor obtained from March 2006 US Army Corps of Engineers Civil Works Construction Cost Index System (USACE CWCCIS) for time period between first quarter fiscal year 2004 to fourth quarter fiscal year 2006 (pages A-17 and A-18).

Notes referencing "I-X" are referring to specific cost tables in the Final FS.

FS or PP Costs refers to original costs as presented in the Final Feasibility Study or Proposed Plan.

a. BMP Costs estimated by acreage and engineering judgement as to what may be needed and what realistically can be built in each drainage. See Attachment D of Appendix I of FS.

b. Total Cost represents estimated annual costs.

c. Costs from 2004 FS escalated to 2006 costs by factor of 17.4 percent (USACE 2006).



**Table 12-9**

**Summary of Capital and O&M Costs for Selected Remedy - Institutional Controls**  
**Record of Decision**  
*Butte Priority Soils Operable Unit*  
*Silver Bow Creek/Butte Area NPL Site*

Item	Notes	Start and End Years	Total Cost	Discount Factor at 3%	Present Value
<b>Capital Costs</b>					
Establish IC's	I-2, a	0	\$ 50,000	--	\$ 50,000
<b>Total Capital Cost</b>					<b>\$ 50,000</b>
<b>Annual O&amp;M Costs</b>					
Implement Existing IC's	I-1	1-99	\$ 5,000	31.547	\$ 157,735
Implement New IC's	I-2, c	1-99	\$ 10,000	31.547	\$ 315,470
<b>Annual O&amp;M Total</b>					<b>\$ 473,200</b>
<b>TOTAL PRESENT VALUE COSTS</b>					<b>\$ 523,000</b>

**Notes:**

3% discount factor used for Present Value Calculations. Although EPA guidance uses a 7% discount factor for present value calculations, a 3% figure is used in this ROD because it reflects more realistic investment return and inflation conditions. The FS guidance allows the use of other interest (discount) rates as published by the Office of Management and Budget (OMB). The 30-year real interest rate is 3%, and OMB allows that rate for programs that will have a duration longer than 30 years (OMB Circular No. A-94, January 2006).

Notes referencing "I-X" are referring to specific cost tables in the Final FS

- a. Assumed 600 hours, \$75/hr, with 10% project management
- b. No Capital Cost associated with existing IC's
- c. Assumed annual cost to implement new IC's was 20% of total capital cost
- d. Total Cost represents estimated annual costs



**Table 12-10**  
**Cost Summary for Selected Remedy**  
**Record of Decision**  
*Butte Priority Soils Operable Unit*  
*Silver Bow Creek/Butte Area NPL Site*

Item	Reference Table	Present Value (Low Range)	Present Value (High Range)
<b>Capital Costs</b>			
Solid Media	Table 12-3	\$ 33,390,000	\$ 33,390,000
Groundwater	Table 12-4	\$ 2,220,000	\$ 2,220,000
Surface Water (no storm water treatment)	Table 12-5	\$ 21,460,000	\$ -
Surface Water (storm water treatment necessary)	Table 12-5	\$ -	\$ 37,590,000
Institutional Controls	Table 12-9	\$ 50,000	\$ 50,000
<b>Total Capital Costs</b>		<b>\$ 57,120,000</b>	<b>\$ 73,250,000</b>
<b>Annual Costs</b>			
Solid Media	Table 12-6	\$ 10,920,000	\$ 10,920,000
Groundwater	Table 12-7	\$ 13,270,000	\$ 13,270,000
Surface Water (no storm water treatment)	Table 12-8	\$ 27,680,000	\$ -
Surface Water (storm water treatment necessary)	Table 12-8	\$ -	\$ 58,590,000
Institutional Controls	Table 12-9	\$ 473,200	\$ 473,200
<b>Total Annual Costs</b>		<b>\$ 52,343,200</b>	<b>\$ 83,253,200</b>
<b>Periodic Costs</b>			
5-Year Reviews		\$ 306,500	\$ 306,500
<b>SELECTED REMEDY COST</b>		<b>\$ 109,800,000</b>	<b>\$ 156,800,000</b>

**Notes:**

3% discount factor used for Present Value Calculations. Although EPA guidance uses a 7% discount factor for present value calculations, a 3% figure is used in this ROD because it reflects more realistic investment return and inflation conditions. The FS guidance allows the use of other interest (discount) rates as published by the Office of Management and Budget (OMB). The 30-year real interest rate is 3%, and OMB allows that rate for programs that will have a duration longer than 30 years (OMB Circular No. A-94, January 2006).

5-Year Review Cost = \$50,000 each



## 12.5 Expected Outcomes of the Selected Remedy

The BPSOU includes a large portion of Walkerville and part of Butte. Most of the OU is located in an older, historic urban setting. The OU encompasses all land use types typical of urban areas: residential, industrial, commercial, and recreational (see Figure 1-3). It includes a number of private and public schools, parks, and playing fields. Several rail lines also run through the OU. There is no agricultural land within the OU, and studies have shown that, due to climate and soil type, gardening is not a common practice in Butte. Table 12-11 presents a summary of the anticipated outcomes of the Selected Remedy by media (solid media, groundwater, and surface water). The expected outcome of the solid media remedy is described separately with respect to residential and non-residential components of the Selected Remedy.

**Table 12-11**  
**Expected Outcomes of the Selected Remedy**  
 Record of Decision  
*Butte Priority Soils Operable Unit*  
*Silver Bow Creek/Butte Area NPL Site*

Site Scenario	Residential Components – Solid Media
Land Use and Time Frame	All residential properties within the BPSOU will be sampled and remedial action will be taken for properties exceeding RGs within a 15-year time frame at the most, if done in conjunction with a comprehensive program. If not, yard and indoor dust remediation will be accomplished within 3 years. This will quantify conditions at all residential properties. If done under a comprehensive program, human health will be protected not just from contaminated soils, but also from potential exposures via non-mining related sources.
Groundwater Use and Time Frame	NA
Anticipated Socio-Economic and Community Revitalization Impacts	The residential metals program will be protective of human health and particularly protective of sensitive populations (children, pregnant or nursing mothers, etc.) by prioritizing abatement of their residences.  By quantifying COC concentrations at all residential properties, conditions site-wide are known to all residents and BSB county, who can then manage properties appropriately, and after residential properties are abated, can move beyond the "stigma" associated with Superfund in the Butte Community.
Anticipated Environmental and Ecological Impacts	In general, similar to non-residential components, yard removals would mitigate a pathway between source areas and the environment and address human health risks at the BPSOU effectively.
Site Scenario	Non-Residential Components – Solid Media
Land Use and Time Frame	Additional reclamation at source areas that exceed RGs for arsenic and lead will protect human health. The remaining reclamation can be completed within a few years. Additional reclamation will enhance the appearance of the Butte Hill.  The Granite Mountain Memorial Area reclamation plan will be consistent with local land use planning and will protect visitors from source areas exceeding RGs, while preserving a viewscape of the mining setting that is in a location where risks to human health and the environment are minimized.  The Syndicate Pit will be reclaimed in a protective manner and used as a mine training center.
Groundwater Use and Time Frame	NA
Anticipated Socio-Economic and Community Revitalization Impacts	Reclamation in general improves the appearance of the Butte Hill. Reclaimed areas can be used for recreation (open space, trails, etc.)  Source areas can be considered for remedy-compatible development (buildings, parking lots, etc. generally make good covers) and should not hamper redevelopment.
Anticipated Environmental and Ecological Impacts	Caps will serve as a barrier between waste materials and the environment, thus effectively addressing human health and environmental impacts. Long term maintenance under the detailed BRES program will ensure long term protection.



**Table 12-11 - Continued**  
**Expected Outcomes of the Selected Remedy**  
**Record of Decision**  
*Butte Priority Soils Operable Unit*  
*Silver Bow Creek/Butte Area NPL Site*

<b>Site Scenario</b>	<b>Groundwater Components</b>
Land Use and Time Frame	The removals and groundwater capture components already built at LAO and the MSD have drastically decreased contaminant loading to Silver Bow Creek, improved habitat, and have made the areas more attractive visually than before. At LAO, land use will be devoted to water treatment and hydraulic control, but development could be considered in the future as long as it was compatible with the remedy. Existing land use in the MSD will not likely change (i.e., business district) and appropriate development can be considered for the lower reaches of the MSD.
Groundwater Use and Time Frame	There are no viable groundwater resources in the upland setting. Alluvial groundwater has not been used as a municipal source in the past. The remedy will not restore the aquifer to applicable standards in a reasonable period of time. Waste will be left in place. A technical impracticability ARAR waiver, ICs, and a controlled groundwater area will be required.
Anticipated Socio-Economic and Community Revitalization Impacts	No negative socio-economic impacts because extensive and disruptive removal of saturated waste materials will not occur.
Anticipated Environmental and Ecological Impacts	Groundwater will be captured and treated, preventing degradation of Silver Bow Creek.
<b>Site Scenario</b>	<b>Surface Water Components</b>
Land Use and Time Frame	Regulatory driver for additional reclamation on the Butte Hill (i.e., source areas that do not exceed human health RGs).  Silver Bow Creek channel reconstruction and sediment removal will further protect environmental receptors, enhance environmental habitat, and make the stream corridor attractive for recreation and development that would be compatible with the remedy.
Groundwater Use and Time Frame	NA
Anticipated Socio-Economic and Community Revitalization Impacts	The BMP program will also improve/upgrade storm water infrastructure and the upland setting on the Butte Hill, further enhancing the appearance of the Butte Hill.
Anticipated Environmental and Ecological Impacts	With groundwater capture and treatment, channel reconstruction, sediment removal, an effective BMP program, environmental conditions in Silver Bow Creek will likely be able to support a fishery, meeting this RAO. BMPs will decrease contaminant loading to Silver Bow Creek during storm events to acceptable levels.

## 12.6 Performance Standards

This ROD defines performance standards for solid media, groundwater, and surface water at the BPSOU that will be used to measure the overall effectiveness of the remedy over the long term. Performance standards are directly linked to the long-term protection of human health and the environment from contaminants of concern present at the BPSOU, and include the final ARARs for the site (Appendix A). Performance will be monitored through comprehensive and interrelated monitoring programs for each media, respectively. These monitoring programs will be planned, reviewed, and approved by EPA.



### 12.6.1 Solid Media

Action levels for contaminated solid media in residential and non-residential portions of the BPSOU are shown in Tables 12-1 and 12-2, respectively. All contaminated solid media within the BPSOU containing concentrations of arsenic, lead, or mercury above the respective action levels will be addressed. Also, source areas that do not exceed action levels will be addressed if diagnostic monitoring performed as part of the surface water management and BMP program indicates that the source area contributes contaminant loads to receiving surface waters during wet weather runoff conditions. In residential areas, yard soils will be removed and replaced and interior dust will be removed. In non-residential areas, source areas will be addressed using land reclamation techniques including partial removal of contaminated materials, grading, capping with coversoil, and revegetation.

The Butte Reclamation Evaluation System establishes the performance standard for all solid media response actions under the Selected Remedy. The system is specifically designed for use in the upland environment of Butte. To accommodate the diverse land types and end land uses within the BPSOU, the BRES is designed to address reclaimed uplands in residential, recreational, and commercial/industrial land settings, excluding: manicured residential lawns and yards, and playgrounds. The system also has components that allow it to be applied to areas reclaimed as open space within this urban setting. Reclaimed areas, including cover soil caps, must achieve the proposed performance standards described by EPA in the Butte Reclamation Evaluation System document (Appendix E). This system is a site-specific tool to evaluate the stability, integrity, and degree of human and environmental protectiveness afforded by response actions initiated on lands impacted by mining within the OU.

The Butte Reclamation Evaluation System is an evaluation tool for reclaimed and revegetated land, relying on routine inspections to assess the:

- ❑ Condition and diversity of vegetative cover
- ❑ Presence of erosion
- ❑ Condition of site edges
- ❑ Presence of exposed waste material
- ❑ Presence of bulk soil failure or mass instability
- ❑ Presence of barren areas or gullies

The system also sets corrective action “triggers” as listed above. Based on the periodic monitoring and evaluation of response action sites, the triggers noted above will prompt corrective action. Vegetated cover soil caps must support a diverse plant community including native species to the extent that the constituents of the vegetation cover are not incompatible with the remedy.



## 12.6.2 Groundwater

The Selected Remedy requires the capturing and treating groundwater as described above. The Selected Remedy will not and is not intended to clean up groundwater to meet groundwater standards (MCLs). As stated above, groundwater standards for the alluvial aquifer will be waived. Therefore, there are no performance standards for groundwater in the alluvial aquifer that is covered by the TI waiver. The TI boundary is shown in Figure 12-6. Since the Selected Remedy requires that contaminated plumes be prevented from migrating outside the established TI zone, the boundary for the TI zone represents the Point of Compliance boundary for groundwater. Groundwater quality standards (Table 8-1) will apply to groundwater at and beyond the edge of this boundary.

In other areas of the TI zone, neither the extent of contamination nor the groundwater flow direction is well enough defined. Based on the data collected during the groundwater monitoring program, additional points of compliance may be determined necessary in remedial design (e.g., southern edge of the MSD).

Groundwater contamination outside of the boundary of the TI zone in excess of groundwater performance standards identified in Table 8-1 shall constitute a violation triggering one or more of the following actions by EPA: 1) re-assess groundwater collection and treatment effectiveness components of the Selected Remedy (e.g., use of additional subdrains, hydraulic control channels, or extraction wells); or 2) complete a TI evaluation for the aquifer in areas of groundwater contamination located outside the compliance boundary.

Design of a groundwater treatment system and sludge disposal facility must be approved by EPA, in consultation with DEQ, and the construction, operation, and maintenance of the facility will be monitored by EPA and the State. The facility will be designed to meet State and Federal water quality standards. Design, construction, maintenance, and monitoring of the facility will be conducted according to the engineering standards established during remedial design, and must be approved by EPA in consultation with the State. Treated water discharged to Silver Bow Creek shall meet all discharge requirements set forth in the ARARs (Appendix A), and this ROD (see Section 12.6.3.1). Discharge from the groundwater treatment plant will meet applicable water quality criteria. This discharge to surface water is discussed in greater detail in the following section.

## 12.6.3 Surface Water

The overall remedial goal for Silver Bow Creek is to maintain the in-stream concentration of site-specific COCs (aluminum, arsenic, cadmium, copper, lead, mercury, silver and zinc) below the numeric surface water quality standards identified in DEQ-7 for all flow conditions throughout the length of Blacktail Creek, Grove Gulch Creek and Silver Bow Creek within and directly downstream of the BPSOU.

This ROD requires an EPA approved comprehensive, long-term surface water monitoring program that will include collection of compliance and diagnostic flow



and chemistry data for normal flow and wet weather conditions in receiving surface waters and within intermittent storm water conveyances at the BPSOU. The monitoring program will use and build upon monitoring and sampling components described in the BPSOU RI/FS and Lower Area One Expedited Response Action Phase II Monitoring Program (ESA 1998) and the Interim Surface Water Monitoring Plan, which was developed for storm water data collection during the interim period between the completion of the RI/FS and the Consent Decree.

#### **12.6.3.1 Point Source Discharge from Groundwater Treatment Facility**

As previously described, the lagoon treatment facility will be evaluated and re-designed, if necessary, to treat contaminated groundwater captured from MSD and LAO. Treated water discharged to Silver Bow Creek shall meet all Federal and State discharge requirements. Because of the water quality improvements in Silver Bow Creek, basing the effluent standards on "I" class standards ("one-half of the mean in-stream concentration") is becoming less and less relevant. Therefore, the treatment plant will meet "end of pipe" discharge standards defined as the lesser of the chronic or human health surface water quality standards presented in Table 8-2.

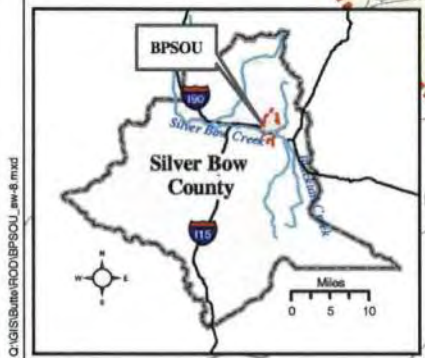
Paired total recoverable and dissolved samples will be collected. Hardness-based standards will be calculated using the hardness of the sample collected from the treatment plant discharge, as directed by Circular DEQ-7. Two, 24-hour composite samples will be collected each week on random days to monitor compliance (for example, sampling will not be limited to Mondays and Thursdays).

Other analytes that shall be monitored include: dissolved calcium and magnesium (for hardness calculations), total alkalinity, total dissolved solids, total suspended solids, and sulfate. Temperature and pH will be monitored daily. Additional required field parameters will be determined based on the operational needs of the facility.

#### **12.6.3.2 In-Stream Compliance during Normal Flow Conditions**

In-stream surface water quality must meet surface water ARARs during normal flow conditions. Surface water flow and chemistry will be collected at least monthly from compliance monitoring stations GG-01 (Grove Gulch), SS-04 (Blacktail Creek), and stations SS-05, SS-05A, SS-06A, SS-06G, and SS-07 in Silver Bow Creek (Figure 12-7). All in-stream water quality samples shall be collected using the channel width integrated composite technique specified in the Clark Fork River Superfund Site Investigations Standard Operating Procedure (CFRSSI SOP) SW-1 - Collection of Surface Water Samples. Because of poor mixing at station SS-07, and the critical nature of this station, samples at SS-07 shall be collected using the depth and width integrating technique (used by the USGS), breaking the stream into 20 to 25 sections from bank to bank, and a churn splitter. Annual data summary and interpretation reports will be submitted to EPA showing the location, frequency and duration, and magnitude of exceedances for all COCs. The annual report will also present an interpretation for the source and significance of exceedances that occurred during the monitoring year.







### 12.6.3.3 Compliance during Wet Weather Flow Conditions

Wet weather flow conditions are defined as flow greater than 50 cfs at monitoring station SS-07 in Silver Bow Creek or greater than 35 cfs at station SS-04 in Blacktail Creek. These threshold flows are substantially above normal base flows at the respective monitoring stations and were chosen as general guidelines to help ensure that data are collected during true wet weather conditions. These guidelines are subject to change depending on climatic or other site changes (e.g., prolonged drought, future discharge from the Butte Mine Flooding OU, etc.).

Compliance during wet weather conditions means consistently measuring concentrations of COCs at in-stream compliance monitoring locations that are below the Montana DEQ-7 acute aquatic life standards (Table 8-1). This ROD establishes points of compliance for wet weather conditions at monitoring stations GG-01 (Grove Gulch), SS-04 (Blacktail Creek), and stations SS-05, SS-05A, SS-06A, SS-06G, and SS-07 in Silver Bow Creek (Figure 12-7). However, to account for upstream sources of COCs that will not be addressed by the Selected Remedy, event-specific flow and chemistry data will be collected from an additional upstream station in Blacktail Creek (above SS-04) and these data will be considered relative to flow and chemistry data at the in-stream points of compliance in surface water when determining compliance. If water quality standards are exceeded upstream, flow weighted concentrations of COCs at the upstream station will be subtracted from concentrations measured at the compliance monitoring stations to determine compliance.

A minimum of one automated sampler will be installed at each compliance monitoring station and at the upstream monitoring station to obtain data during wet weather conditions. Additional samplers may be installed as deemed necessary during design, at some or all locations to obtain data for different portions of the storm hydrograph.

At the conclusion of each wet weather monitoring season, an annual data summary and interpretation report will be prepared and submitted to EPA for review. EPA will consider data trends and the magnitude of exceedances observed to assess the likelihood that additional BMPs will continue to decrease contaminant loading during wet weather runoff conditions to the point where action levels will be achieved. If EPA, in consultation with DEQ, determines that further BMPs will not effectively achieve action levels, the RP Group will be directed to begin capturing and treating storm water runoff to the extent practicable. To provide ample time for BMPs to be implemented and evaluated for effectiveness, the phased BMP program will be operated through at least two consecutive five-year review cycles or 10 years. Also, a maximum period of 15 years will be permitted for the phased BMP approach to achieve action levels (DEQ-7 acute aquatic life criteria) before storm water treatment is required.

## 12.7 Environmental Justice

In 1994, Executive Order 12898, "Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations," became effective. The purpose



of the Executive Order is to ensure that environmental actions or decisions do not result in disproportionately high and adverse human health or environmental effects by ensuring that the analysis of these effects includes the examination of secondary effects, cultural concerns, and cumulative impacts/effects.

The objective of the environmental justice evaluation conducted at the BPSOU was to determine if high disproportionate and adverse human health or environmental effects resulted from remediation activities at the site.

Achieving environmental protection for all communities is a fundamental part of the EPA's mission. Since 1992, the Agency has made this unequivocal commitment to identifying and addressing disproportionately high and adverse human health and environmental effects in minority and/or low income communities.

The Environmental Justice Program has completed its evaluation of the environmental actions undertaken at the BPSOU and based on a review of the Administrative Record and interviews of the site program managers, has determined that the EPA has taken significant steps to address environmental and health concerns at the BPSOU. Residents that live in the BPSOU area are the beneficiaries of the remedial and removal work that EPA has performed. The results of the environmental response actions demonstrate that low-income and minority citizens are being protected from disproportionate impacts.

Based upon a review of the Administrative Record, discussions with the staff of the Montana EPA Office, and citizen concerns, the Region 8 Environmental Justice Office offers the following conclusions and recommendations:

1. In Butte, Montana, EPA's overall mission has been to ensure that all of Butte's citizens receive protection from significant risks to human health and the environment. This mission has been a priority from the time that the designation as an NPL site was first made. Although the Montana EPA office may not have stated explicitly that they are dealing with a low-income community, they have acted to protect the low-income community as they have in fact provided environmental protection to all segments of the population of the BPSOU.
2. The Administrative Record indicates that the low-income community at the BPSOU has been provided with means that ensure that their views are heard. Public meetings are well advertised, efforts have been made to be inclusive to all interested groups and meeting places and times have been varied so that the largest groups of people could attend.
3. Because of the complexity of the BPSOU site, several removal actions are to be expected as EPA works to protect human health and the environment. The feasibility study developed by the EPA, reviewed each of the removal actions taken at the BPSOU and reviewed those actions utilizing the nine NPL evaluation criteria.



4. The Montana EPA Office has investigated the attic dust concern. The BSB Lead Abatement Program has cleaned up numerous attics.
5. EPA has designated a local spokesperson for the BPSOU site and has established a project office in the City of Butte. The Montana EPA Office has designated a local spokesperson for the BPSOU for each emergency response action taken. Both spokespersons work to keep the public informed and to respond to questions that may arise.
6. Low-income mothers and children have been determined to be an at-risk group and therefore, EPA has initiated several different environmental and health programs to address lead contamination. Residential yards, homes, parks and play areas have been remediated. Homes have had attics, basements, siding, carpets, and paint removed, replaced, or remediated by an acceptable method. Low-income citizens at this site do not appear to be receiving any negative or disparate treatment.

In conclusion, the Region 8 Environmental Justice Program believes that the EPA has served all communities at the BPSOU in the same manner as others similarly situated. Looking at the totality of circumstances at this site and at this potential Environmental Justice low-income community, the EPA has worked to protect all Butte citizens from significant risks to human health and the environment. This work has been done in a fair manner, with meaningful public involvement.



## Section 13 Statutory Determinations

Under CERCLA Section 121 and the NCP, EPA must select a remedy that is protective of human health and the environment, complies with or appropriately waives ARARs, is cost effective, and utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that includes treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element. The following sections discuss how the Selected Remedy meets these statutory requirements.

### 13.1 Protection of Human Health and the Environment

The Selected Remedy includes components to address human health and environmental risks associated with mining-related wastes and contaminated soils in residential and non-residential areas, residential indoor and attic dusts, alluvial groundwater, and surface water. Unacceptable human health or environmental risks identified in the risk assessment process will be addressed. The Selected Remedy will be monitored and maintained through comprehensive programs using institutional controls, monitoring, and maintenance. There are no short-term threats associated with the Selected Remedy that cannot be readily controlled through applicable health and safety requirements, monitoring, and standard construction practices. In addition, no adverse cross-media impacts are expected from the Selected Remedy.

#### 13.1.1 Solid Media

##### *Non-Residential Source Areas*

Non-residential areas include previously reclaimed source areas, unreclaimed source areas, sites not granted “conditional no further action status”, and areas such as the Syndicate Pit and Granite Mountain Memorial. The Selected Remedy will protect human health and the environment through the prevention of direct contact with contaminants in these areas. Engineering controls will effectively isolate waste materials, thus preventing human and environmental exposures. These engineering controls include source removal to a repository, consolidation, grading, capping, and land reclamation for areas exceeding lead and arsenic action levels and other source areas demonstrated to contribute contaminant loads to receiving surface waters. Protection will be maintained via a comprehensive O&M plan to ensure the reclamation is achieving performance standards set forth in the BRES. Institutional controls, such as county zoning and permit requirements, will be implemented to ensure that the remedy is not disturbed inappropriately.

##### *Residential Areas*

The Selected Remedy addresses elevated arsenic, lead, and mercury in residential areas in two ways. First, all residential properties in the OU will be sampled and those that exceed action levels will be remediated. Second, the Selected Remedy hopes to retain the multi-pathway program intended to further protect human health by



providing a reduction in COCs from a range of potential sources. The program is designed to comprehensively help prevent residential exposures with actions that address a variety of sources, some of which are not mining-related and would not normally be remediated under Superfund (e.g., lead-based paint). The potential sources of lead, arsenic, and/or mercury exposure that will be addressed include soil, house dust, non-living space dust (only if an exposure pathway is established), and interior paint (lead only for paint). This inclusive approach prioritizes residential cleanups to take into account the presence of affected or sensitive populations and non-mining sources of contaminants. EPA believes that the combined programs are the most protective of human health in the BPSOU in the long-term. The multi-pathway program protects sensitive populations from all pathways of exposure, while the all-encompassing sampling and remediation program ensures that all properties within the BPSOU that exceed RGs will ultimately be addressed.

### **13.1.2 Groundwater**

Hydrogeologic conditions in the Metro Storm Drain and LAO areas (i.e., shallow bedrock) allow for the capture of nearly all alluvial groundwater prior to exiting the basin. This groundwater will be routed to a lime precipitation treatment facility at LAO for removal of contaminants and then discharged to Silver Bow Creek. The discharge shall meet the lesser of the chronic aquatic life or human health surface water quality standards presented in Table 8-2. Although the Selected Remedy will not achieve compliance with State standards (DEQ-7) for groundwater in a reasonable time-frame, discharge of metals-contaminated groundwater to surface waters will be prevented.

Base flow from Missoula Gulch will be routed to the LAO hydraulic control channel for treatment along with captured groundwater.

West Camp water from the Butte Mine Flooding Operable Unit will also be routed to the LAO treatment facility. The LAO treatability study showed that the lime treatment facility could effectively treat the combination of West Camp water and alluvial groundwater.

Municipal drinking water is provided from a source outside Butte and domestic use of contaminated groundwater is presently controlled by an ordinance that discourages residential well use. As part of the ICs package, use of alluvial groundwater will be prevented by the expansion of a groundwater control area to include other portions of the BPSOU and possibly other measures. Extensive groundwater monitoring will be conducted to ensure that the groundwater controls are effective and protective of receiving surface waters.

### **13.1.3 Surface Water**

The Selected Remedy will address human health and environmental risks to surface water through the removal of remaining contaminated stream sediments and streambank wastes, and the implementation of a surface water management and BMP program to reduce contaminant loading from storm water runoff. Sediments and



streambank wastes will be removed from Blacktail Creek just above the confluence with the Metro Storm Drain and along Silver Bow Creek down to the reconstructed channel at LAO.

Metals occur in discrete waste piles and are disseminated in soils across the surface of the Butte Hill and, as a result, are readily carried by storm water runoff resulting in exceedances of acute water quality standards in receiving streams during most runoff events. The BMP approach for storm water compliance is established nationally as the most effective means to mitigate impacts from runoff at urban and industrial sites. The BMP approach specified in this ROD is an iterative, site-specific program designed to monitor, identify sources of contamination, and take appropriate corrective action. It will be an aggressive program to monitor water quality in Silver Bow Creek, use these data to target problem areas on the Butte Hill, and design and implement site-appropriate BMPs. The effectiveness of the BMPs will be assessed through continued monitoring. It is likely that monitoring will identify previously unknown source areas that should be addressed. If BMPs are not effective in achieving surface water quality standards in Silver Bow Creek, lime treatment of storm water runoff would be required.

## 13.2 Compliance with ARARs

The final determination of ARARs by EPA is listed in Appendix A of this ROD. Section 121(d) of CERCLA requires that remedial actions attain a degree of cleanup that ensures protection of human health and the environment and that those remedial actions comply with or appropriately waive ARARs. There are three types of ARARs: contaminant-specific, action-specific, and location-specific.

ARARs for the Butte Priority Soils OU were identified and thoroughly evaluated by EPA as part of the Feasibility Study Analysis of Alternatives. Overall, the preferred remedy is expected to eventually achieve compliance with the key ARARs, except for Federal and State groundwater quality standards in the alluvial aquifer in the Metro Storm Drain and in Lower Area One. A waiver for certain groundwater ARARs is provided in this ROD<sup>7</sup>.

The following briefly discusses the most significant of those ARARs for solid media, groundwater, and surface water. Except where noted, this discussion applies to both the Selected Remedy site-wide and the Selected Remedy for the Metro Storm Drain.

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<sup>7</sup> See footnote 3 on page D-12 for an explanation of how this waiver of groundwater ARARs also applies to possible floodplain or solid waste ARARs, which may apply to waste left in place in current floodplains.



### 13.2.1 Solid Media

The Selected Remedy for solid media at the BPSOU includes monitoring engineering covers, vegetation, and solid media left in place; operations and maintenance of past and future actions; ICs; compliance with existing mandated actions; the BPSOU Residential Metals Abatement Program for residential contamination; source area covers; limited future waste removal; and waste repository management. Waste removal refers to the potential removal of source areas possibly identified by the storm water monitoring program or by the ICs.

Because “active management” of solid wastes is planned for certain waste areas (not all waste left in place), certain location-specific federal solid waste<sup>8</sup>, mining, and waste regulations and state<sup>9</sup> solid waste regulations are ARARs at the BPSOU. Also, action-specific state solid waste requirements are applicable ARARs<sup>10</sup>, and will be complied with if wastes are excavated and disposed in the future.

Action-specific reclamation requirements related to solid media are ARARs for the OU<sup>11</sup> and will be met by the Selected Remedy. This requires revegetation of the land as rapidly, completely, and effectively as the most modern technology and the most advanced state of the art will allow. Relevant and appropriate hydrogeology regulations under this act are also ARARs that will be met by the Selected Remedy.

### 13.2.2 Groundwater

Capturing groundwater and diverting for treatment provides for long-term protection of Silver Bow Creek but does not achieve ARARs in the alluvial aquifer. The contaminant-specific ARARs for groundwater, shown in Section 8, will not be met. The Selected Remedy does not call for removal of any additional source areas within LAO or Metro Storm Drain. EPA has determined that complete removal of these source areas is not feasible and would not have a significant impact on the eventual attainment of ARARs, because contamination has already spread well beyond the boundaries of the source areas and secondary sources within the alluvium will continue to result in exceedances of groundwater quality standards even if source areas are removed. Additionally, the cost and disruption to the community from removing wide-spread source areas in this urban corridor cannot be justified by the results. This is explained more fully in the TI Evaluation document, and in EPA’s detailed response to comments on the TI Evaluation.

The contaminant-specific ARARs for alluvial groundwater will be waived within the TI Evaluation boundary. Groundwater contamination will be addressed via

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<sup>8</sup> Solid Waste Disposal Act, Surface Mining Control and Reclamation Act, Resource Conservation and Recovery Act

<sup>9</sup> Montana Solid Waste Management Act (75-10-201 et. seq. MCA)

<sup>10</sup> Montana Solid Waste Management Regulations (ARM 15.50.505(2))

<sup>11</sup> Montana Strip and Underground Mine Reclamation Act (82.4.201 to 205 MCA)



groundwater capture and lime treatment. Groundwater will be controlled and captured via the LAO hydraulic control channel and the subdrain in the Metro Storm Drain. Captured groundwater will be routed to a lagoon treatment facility at LAO. Remaining saturated solid media in LAO and the Metro Storm Drain will be left in place. Treated water discharged to Silver Bow Creek shall meet all State and Federal point source discharge requirements. Compliance monitoring locations will be specified in the site-wide monitoring program and finalized during Consent Decree negotiations. Sludge produced shall be disposed of in compliance with Federal and State solid waste regulations.

The Selected Remedy for groundwater also specifies the establishment of ICs to prevent use of the aquifer as a drinking water source and an operations and maintenance programs to monitor past and future groundwater actions. To the extent a controlled groundwater area will not prevent the use of existing wells, an education and well abandonment program will be implemented to persuade owners not to use contaminated water and to voluntarily take existing wells out of service in exchange, for example, for being hooked up to public water. An administrative entity will be identified under RD/RA to monitor and enforce these restrictions. The RP Group will be responsible for developing, funding and implementing the ICs as part of the final site-wide ICs Plan.

### 13.2.3 Surface Water

The State of Montana has promulgated specific water quality standards applicable to the use designation of Silver Bow Creek<sup>12</sup>. Those standards will be applied to all chemicals of concern identified at the BPSOU, both to point sources affected or created by the cleanup and to ambient water. However, discharges from groundwater and storm water treatment systems must meet the lesser of the chronic aquatic life or human health surface water quality standards presented in Table 8-2. If the State standards are changed to be less stringent, the Federal water quality criteria will be identified as the appropriate ARARs.

Surface water at the BPSOU is impacted by contributions of contaminated groundwater and storm water. The Selected Remedy will evaluate the contribution from groundwater as remediation progresses and will ensure that appropriate storm water controls are implemented.

Storm water controls will be implemented based on site-specific evaluation. These controls may include, but are not limited to: storm water retention basins, rerouting, and engineered sediment controls. The storm water controls will meet the applicable state storm water ARARs<sup>13</sup> that require general storm water permits for certain

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<sup>12</sup> MT Water Quality Act (Administrative Rules of Montana [ARM] 17.30.607 (l)(a)(iii))

<sup>13</sup> MT Pollutant Discharge Elimination System (ARM 17.30.601 et seq. and 17.30.1301 et seq., including 17.30.1332)



activities and refer to the requirement of BMPs to minimize or prevent discharge that may adversely affect human health or the environment.

A monitoring program will evaluate the impacts of the storm water controls on receiving water quality. Additional controls will be implemented if the monitoring program indicates further action is needed.

This combination of monitoring and controls is expected to gradually reduce concentrations of contaminants in surface water, allowing eventual achievement of the concentration-specific ARARs. The ARARs allow for the gradual attainment of requirements in already impacted streams, with the goal of eventual attainment of ARARs.

If the storm water controls are not effective, storm water up to a specific design storm will be captured and treated with lime before being released. EPA, in consultation with DEQ, will make the final determination concerning the effectiveness of the storm water program. The preferred remedies also specify the use of ICs and an operation and maintenance program to ensure the success of interim and final remedial actions.

Certain Federal and State location-specific ARARs are applicable to surface water at the BPSOU because much of the site lies within the floodplain of Silver Bow Creek<sup>14</sup>. It is not anticipated that the Selected Remedy for the OU will have an adverse impact on floodplains or wetlands at the site; if anything, the Selected Remedy would likely improve these areas. However, EPA will consult with the U.S. Fish and Wildlife Service to determine the existence and category of wetlands present at the site and any needed avoidance or replacement. If the Selected Remedy, or subsequent alterations, will impact stream banks or streambeds, EPA will also consult with the U.S. Fish and Wildlife Service; Montana Department of Fish, Wildlife and Parks; Butte-Silver Bow, and the local conservation district, as needed.

### **13.2.4 Other ARARs**

Several federal location-specific ARARs are applicable to the OU and will be met by the Selected Remedy through consultation with the appropriate state and federal agencies and other resources. These ARARs include a variety of acts and treaties<sup>15</sup>

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<sup>14</sup> Federal: Fish and Wildlife Coordination Act (40 CFR 6.302(g)), Floodplain Management Order and Protection of Wetlands Order ((40 CFR Part 6 Appendix A Exec. Order 11,988 and 11990, respectively). State: Floodplain and Floodway Management Act (ARM 36.15.101(13)) Natural Streambed and Land Preservation Standards (Montana Code Annotated [MCA] 87-5-502 and 504)

<sup>15</sup> Endangered Species Act (40 CFR 6.302(h)); National Historic Preservation Act (40 CFR 6.301(b)); Archeological and Historic Preservation Act (40 CFR 6.301(c)); Historic Sites, Buildings, and Antiquities Act (40 CFR 6.310(a)); Migratory Bird Treaty; Bald Eagle Protection Act; and Native American Grave Protection and Repatriation Act



designed to protect endangered species, bald eagles, and migratory birds; encourage historic, archeological, and antiquities preservation; and protect Native American graves. EPA will involve the Tribes and the U.S. Fish and Wildlife Service and historical preservation agencies in remedial design to ensure compliance with these ARARs.

Federal and state standards for air<sup>16</sup> are action-specific ARARs at the OU. These standards are applicable to releases of lead and particulate matter during remediation. EPA anticipates that these ARARs can be met through the implementation of appropriate, standard operating procedures.

### 13.3 Cost Effectiveness

In EPA's judgment, the Selected Remedy is cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness" [NCP § 300.430(f)(1)(ii)(D)]. This was accomplished by evaluating the overall effectiveness of the Selected Remedy and comparing that effectiveness to the overall costs. Overall effectiveness was evaluated by examining how the Selected Remedy meets three of the balancing criteria in combination - long-term effectiveness and permanence; reduction in toxicity, mobility, and volume; and short-term effectiveness. Overall effectiveness of the remedial alternatives was then compared to costs to determine cost-effectiveness. The relationship of the overall effectiveness of the alternatives was not necessarily proportional to costs.

It is important to note that more than one cleanup alternative may be cost-effective, and that Superfund does not mandate the selection of the most cost-effective cleanup alternative. In addition, the most cost-effective remedy is not necessarily the remedy that provides the best balance of tradeoffs with respect to the remedy selection criteria nor is it necessarily the least-costly alternative that is both protective of human health and the environment and ARAR-compliant.

Net present worth costs for each alternative were compared (see the evaluation of comprehensive alternatives in Table 10-1). The range of costs for each alternative represents the range and possible scope of actions to address mine waste and contaminated soil on the Butte Hill, storm water runoff, the treatment of collected groundwater, and different Metro Storm Drain waste material options. The cost of the Selected Remedy is expected to be \$110 to \$157 million (Table 12-10). EPA believes an appropriate balance between cost-effectiveness and adequate protectiveness is achieved in the Selected Remedy.

A significant amount of attention was focused on the remedy for the Metro Storm Drain area. Complete removal of the wastes in the Metro Storm Drain, as discussed in the analysis of alternatives, could cost \$220 million, but would not effectively clean up

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<sup>16</sup> Federal Clean Air Act(40 CFR 50.6) and Clean Air Act of MT (ARM 17.8.233)



the aquifer within a reasonable time frame to the point that groundwater standards are achieved or that long-term capture and treatment is not required. Analyses indicated that even by removing wastes, low aquifer permeability and wide distribution of residual contamination would prohibit the aquifer from meeting groundwater standards for hundreds of years. Regardless of the scale of the removal, groundwater would need to be treated for the foreseeable future. Additionally, extensive removals in the urban Metro Storm Drain corridor would cause significant disruption and pose short-term risks to the community. Managing the wastes in-place was determined by EPA to be both cost-effective and protective.

### **13.4 Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable**

This determination looks at whether the Selected Remedy provides the best balance of trade-offs among the alternatives with respect to the balancing criteria set forth in NCP §300.430(f)(1)(i)(B), such that it represents the maximum extent to which permanence and treatment can be practicably utilized at this site. NCP §300.430(f)(1)(ii)(E) provides that the balancing shall emphasize the factors of “long-term effectiveness” and “reduction of toxicity, mobility, or volume through treatment,” and shall consider the preference for treatment and bias against off-site disposal. The modifying criteria were also considered in making this determination.

EPA has determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be used in a cost-effective manner at the BPSOU. Of those alternatives that are protective of human health and the environment and comply with ARARs or justify a waiver, EPA has determined that the Selected Remedy provides the best balance of trade-offs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element and bias against off-site treatment and disposal, and considering State and community acceptance.

Mine wastes and contaminated soils at the BPSOU are generally of large volume and low contaminant of concern concentration, which is difficult to treat effectively. In addition, technical difficulties prevent effective treatment of various metals present. Thus, active treatment was screened out as potential option for the solid media and long-term effectiveness is achieved through monitored engineering controls. Compared to the large-scale partial and total removal options, the Selected Remedy is expected to have greater short-term effectiveness with a lower level of risk to the community, cleanup workers, and the environment. The Selected Remedy was also among the more implementable of the remedial alternatives considered.

Treatment options were retained, however, for groundwater and surface water. Under the Selected Remedy, groundwater captured at LAO will be combined with contaminated groundwater from the West Camp bedrock system of the BMFOU and contaminated alluvial groundwater from Metro Storm Drain and routed to a lime treatment facility, where it will be treated to meet discharge standards and ARARs,



and subsequently discharged to Silver Bow Creek. Storm water discharge may also be similarly treated if BMPs are not effective in achieving surface water quality standards in Silver Bow Creek.

### **13.5 Preference for Treatment as a Principal Element**

Treatment does not constitute a major component of the remedy for the BPSOU and the Selected Remedy does not satisfy the statutory preference for treatment as a principal element. However, EPA has determined that the source materials present in the BPSOU do not represent a principal threat, thus eliminating the expectation for treatment of these source materials. Although present in large volumes, source materials within the BPSOU are low in toxicity, can be reliably contained, and present only a relatively low risk in the event of exposure.

### **13.6 Five Year Reviews**

Because the Selected Remedy results in contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted pursuant to CERCLA §121(c) and NCP §300.430(f)(5)(iii)(C). EPA shall conduct a review of remedial actions no less often than each five years after the initiation of such remedial action to assure that the remedy is, or will be, protective of human health and the environment.



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## Section 14 Documentation of Significant Changes

The Proposed Plan for the BPSOU was released for public comment in December 2004. The Proposed Plan identified Comprehensive Alternative 4 (Engineered Covers/Partial Removal/ Limited Treatment for Solid Media, Groundwater Collection and Lime Treatment, Surface Water BMPs, ICs, and Monitoring) as the preferred alternative. EPA reviewed all written and verbal comments submitted during the public comment period. It was determined that, with some exceptions, no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary. However, based on the public's concern over potential health risks from residential metals, particularly attic dust, EPA decided to enhance the medical monitoring program already in place as part of the current Lead Intervention and Abatement Program to include the general population (not just sensitive populations) and to include evaluation of urinary arsenic and blood mercury with the blood lead evaluation. EPA will support all efforts to make the attic dust portion of a residential abatement plan workable and effective.

The Proposed Plan identified construction of a new water treatment plant for captured groundwater. The ROD allows the continued use, after appropriate remedial design, of the lagoon treatment system on a demonstration basis. This is based on the continuing data reports which show a general compliance with water standards from the treatment lagoon system, and on the continued consultation with DEQ and Butte Silver Bow County, both of whom found use of the lagoon treatment system on a demonstration basis acceptable. EPA, DEQ, and Butte Silver Bow will carefully evaluate the sludge excavation and disposal activities associated with this aspect of the Selected Remedy during remedial design.

Finally, the estimated cost of the Selected Remedy increased from costs presented in the Proposed Plan. Additional costs were included for upgrades to the storm water system and for the expanded residential metals abatement program. Capital costs were escalated by a factor of 17.4 percent to reflect inflation in the construction industry from 2004 (FS costs are 2004 costs) to 2006. Then, for the present value analysis, a discount factor of three percent was used instead of seven percent. The Agencies believe the three percent discount rate reflects more realistic investment return and inflation conditions. It is more conservative considering the importance of long-term O&M of the Selected Remedy. As a result of these changes, the cost of the Selected Remedy more than doubled.



Section 14  
Documentation of Significant Changes

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## **Section 15 Coordination with Natural Resource Damage Restoration Actions**

The Butte Priority Soils OU has received considerable attention from the State Natural Resource Trustees, as described in section 107(f) of CERCLA. The State has undertaken efforts to develop restoration plans and/or secure restoration money from potentially responsible parties to restore the BPSOU to baseline conditions, or the condition that would exist absent the release of hazardous substances. The State developed and will further refine a restoration plan which, if implemented, would provide for certain actions to restore the injured resources or replace the loss of use of such resources. The State's existing plan is likely to be revised following the issuance of this Record of Decision.

The Selected Remedy is not intended to and will not restore natural resources in the BPSOU to baseline conditions.

The State Trustee may select restoration actions applicable to portions of the BPSOU. If this occurs, EPA will work with the Trustee in the design and implementation of the remedial action to coordinate the implementation of the Selected Remedy with these restoration actions to avoid duplication of effort and unnecessary costs and to maximize benefits to the area, where feasible and practical, and where coordination will not result in substantial delays to remedy implementation.



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IDENTIFICATION AND DESCRIPTION OF  
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS  
FOR FEASIBILITY STUDY ANALYSIS OF ALTERNATIVES

SILVER BOW CREEK/BUTTE AREA SUPERFUND SITE  
BUTTE PRIORITY SOILS OPERABLE UNIT (OU 8)

September 2006



# LIST OF ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirements
ATSDR	Agency of Toxic Substances and Disease Registry
BAT	Best Available Technology Economically Achievable
BCT	Best Conventional Pollutant Control Technology
BPCTCA	Best Practicable Control Technology Currently Available
BPJ	Best Professional Judgment
BPSOU	Butte Priority Soils Operable Unit
BTCA	Best Technology Currently Available
CCC	Criterion Continuous Concentration
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended
CMC	Criteria Maximum Concentration
DEQ	State of Montana Department of Environmental Quality
DEQ-7	Circular DEQ-7, Montana Numeric Water Quality Standards
EPA	U.S. Environmental Protection Agency
HWM	Hazardous Waste Management
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MGWPCS	Montana Groundwater Pollution Control System
MPDES	Montana Pollutant Discharge Elimination System
NCP	National Contingency Plan, as amended
NESHAPS	National Emissions Standards for Hazardous Air Pollutants
NPL	National Priorities List
NPDES	National Pollutant Discharge Elimination System
POTW	Public Owned Treatment Works
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
RD/RA	Remedial Design and Remedial Action
ROD	Record of Decision
SHPO	State Historic Preservation Officer (Montana)
SIP	State Implementation Plan
TCB	To Be Considered
TU	Turbidity Unit
UIC	Underground Injection Control



## INTRODUCTION

Section 121(d) of CERCLA, 42 U.S.C. § 9621(d), certain provisions of the current National Contingency Plan (the NCP), 40 CFR Part 300 (1990), and guidance and policy issued by the Environmental Protection Agency (EPA) require that remedial actions taken pursuant to Superfund authority shall require or achieve compliance with substantive provisions of applicable or relevant and appropriate standards, requirements, criteria, or limitations from state environmental and facility siting laws, and from federal environmental laws, at the completion of the remedial action, during the implementation of the remedial action, or both, depending on the nature of the requirements, unless a waiver is granted<sup>1</sup>. If contaminant or location specific ARARs are not being met before the commencement of a remedial action, it is not necessary to invoke a waiver to justify their non-attainment during the action; although they must be obtained (or appropriately waived) for remedial action to be complete and the remedy to be successful<sup>2</sup>. These requirements are threshold standards that any selected remedy must meet, unless adequate basis for a waiver is present. See Section 121 (d) (4) of CERCLA, 42 U.S.C. § 9621 (d) (4); 40 CFR § 300.430 (f) (1). EPA calls standards, requirements, criteria, or limitations identified pursuant to section 121 (d) "ARARs," or applicable or relevant and appropriate requirements.

ARARs are either applicable or relevant and appropriate. Applicable requirements are those standards, requirements, criteria, or limitations promulgated under federal or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, or contaminant, remedial action, location, or other circumstance found at a CERCLA site. 40 CFR § 300.5. Relevant and appropriate requirements are those standards, requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to hazardous substances, pollutants, contaminants, remedial actions, locations, or other circumstances found at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site such that their use is well suited to the particular site. *Id.* Factors which may be considered in making this determination are presented in 40 CFR 300.400(g) (2). Compliance with both

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<sup>1</sup> See 55 Fed Reg 8666, 8755 (March 8, 1990)

<sup>2</sup> EPA CERCLA Compliance with Other Laws Manual 1-8 (OSWER 9234 1-01, August 1988)



applicable and relevant and appropriate requirements is mandatory, unless compliance is waived. 42 U.S.C. § 121(d)(4); 40 CFR 300.430(f)(1)(C).

Each ARAR or group of related ARARs identified here is followed by a specific statutory or regulatory citation, a classification describing whether the ARAR is applicable or relevant and appropriate, and a description which summarizes the requirements, and addresses how and when compliance with the ARAR will be measured (some ARARs will govern the conduct of the remedial action, some will define the measure of success of the remedial action, and some will do both)<sup>3</sup>. The descriptions given here are provided to allow the user a reasonable understanding of the requirements without having to refer constantly to the statute or regulation itself. However in the event of any inconsistency between the law and the summary provided in this document, the applicable or relevant and appropriate requirement is ultimately the requirement as set out in the law, rather than any paraphrase of the law provided here.

Also contained in this list are policies, guidance or other sources of information which are "to be considered" in the selection of the remedy and implementation of the record of decision (ROD). Although not enforceable requirements, these documents are important sources of information which EPA and the State of Montana Department of Environmental Quality (DEQ) may consider during selection of the remedy, especially in regard to the evaluation of public health and environmental risks; or which will be referred to, as appropriate, in selecting and developing cleanup actions.

Finally, this list contains a non-exhaustive list of other legal provisions or requirements which should be complied with during the implementation of the ROD<sup>4</sup>.

ARARs are divided into contaminant specific, location specific, and action specific requirements, as described in the NCP and EPA guidance. For contaminant specific ARARs, ARARs are listed according to the appropriate media.

Contaminant specific ARARs include those laws and regulations governing the release to the environment of materials possessing

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<sup>3</sup> 40 CFR § 300.435(b)(2), Preamble to the Proposed NCP, 53 Fed Reg 51440 (December 21, 1988), Preamble to the Final NCP, 55 Fed Reg 8755-8757 (March 8, 1990)

<sup>4</sup> 40 CFR § 300.400(g)(3), 40 CFR § 300.515(h)(2), Preamble to the Final NCP, 55 Fed Reg 8744-8746 (March 8, 1990)



certain chemical or physical characteristics or containing specific chemical compounds. Contaminant specific ARARs generally set health or risk based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment. Location specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of cleanup activities because they are in specific locations. Location specific ARARs related to the geographic or physical position of the site, rather than to the nature of site contaminants. Action specific ARARs are usually technology or activity based requirements or limitations on actions taken with respect to hazardous substances.

Only the substantive portions of the requirements are ARARs<sup>5</sup>. Administrative requirements are not ARARs and thus do not apply to actions conducted entirely on-site. Administrative requirements are those which involve consultation, issuance of permits, documentation, reporting, record keeping, and enforcement. The CERCLA program has its own set of administrative procedures which assure proper implementation of CERCLA. The application of additional or conflicting administrative requirements could result in delay or confusion<sup>6</sup>. Provision of statutes or regulations which contain general goals that merely express legislative intent about desired outcomes or conditions but are non-binding are not ARARs.<sup>7</sup>.

Many requirements listed here are promulgated as identical or nearly identical requirements in both federal and state law, usually pursuant to delegated environmental programs administered by both EPA and the states, such as many of the requirements of the federal Clean Water Act and the Montana Water Quality Act. The Preamble to the final NCP states that such a situation results in citation to the state provision as the appropriate standard, but treatment of the provisions as a federal requirement. ARARs and other laws which are unique to state law are identified separately by the State of Montana.

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<sup>5</sup> 40 CFR § 300.5 See also Preamble to the Final NCP, 55 Fed Reg 8756-8757 (March 8, 1990)

<sup>6</sup> Preamble to the Final NCP, 55 Fed Reg 8756-8757 (March 8, 1990), Compliance with Other Laws Manual, Vol 1, pp 1-11 - 1-12

<sup>7</sup> Preamble to the Final NCP, 55 Fed Reg 8746 (March 8, 1990)



This list constitutes EPA's and DEQ's detailed description of potential ARARs for use in the feasibility study for the Silver Bow Creek/Butte Area (Butte Portion) Site, Butte Priority Soils operable unit, and resulting remedial action decisions. This list will be used in evaluating the compliance of the various remedial alternatives with ARARs. However, the final determination of ARARs that will ultimately apply to the operable unit and the final determination of compliance with ARARs or applicability of ARAR waivers will be presented in the ROD.

The ARAR analysis is based on section 121(d) of CERCLA, 42 U.S.C. § 9621 (d); CERCLA Compliance with Other Laws Manual, Volumes I and II; OSWER Directives 9234.1-01 and -02 (August 1988 and August 1989 respectively; various CERCLA ARARs Fact Sheets issued as OSWER Directives; the Preamble to the Proposed NCP, 53 Fed.Reg. 51394 et seq. (December 21, 1988); the Preamble to the Final NCP, 55 Fed.Reg. 8666-8813 (March 8, 1990); and the final NCP, 40 CFR Part 300; other applicable guidances; and the substantive provisions of law discussed in this document.

## FEDERAL ARARS

### I. FEDERAL CONTAMINANT SPECIFIC REQUIREMENTS

#### A. Groundwater Standards - Safe Drinking Water Act (Relevant and Appropriate) <sup>8</sup>

The National Primary Drinking Water Standards (40 CFR Part 141), better known as maximum contaminant levels and maximum contaminant level goals (MCLs and MCLGs), are not applicable to the Butte Priority Soils Operable Unit (BPSOU) because the aquifer underlying the area is not a current public water system, as defined in the Safe Drinking Water Act, 42 U.S.C. § 300f(4). These standards are relevant and appropriate standards, however, because the groundwater in the alluvial aquifer is a potential source of drinking water.

According to the Butte-Silver Bow Health Department only one well within the BPSOU is used as a source of drinking water. EPA has determined that a waiver of ground water standards is appropriate for the area within the zone defined in the Technical

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<sup>8</sup> 42 U S C §§ 300f et seq.



Impracticability Evaluation for the BPSOU (EPA 2006) for all standards<sup>9</sup>. The waiver is based on section 121(d)(4)(C) of CERCLA, 42 U.S.C. Section 9621(d)(4)(C) and corresponding NCP provisions. Outside of the zone, the standards do apply. EPA notes that the aquifer discharges to Silver Bow Creek which is designated as a potential source of drinking water. Since Silver Bow Creek is also a potential source of drinking water, these standards are relevant and appropriate for that surface water as well.

Use of these standards for this action outside of the TI waiver zone is fully supported by EPA regulations and guidance. The Preamble to the NCP clearly states that MCLs are relevant and appropriate for groundwater that is a current or potential source of drinking water (55 Fed.Reg. 8750, March 8, 1990), and this determination is further supported by requirements in the regulations governing conduct of the RI/FS studies found at 40 CFR § 300.430(e)(2)(i)(B). EPA's guidance on Remedial Action for Contaminated Groundwater at Superfund Sites states that "MCLs developed under the Safe Drinking Water Act generally are ARARs for current or potential drinking water sources." MCLGs which are above zero are relevant and appropriate under the same conditions (55 Fed.Reg. 8750-8752, March 8, 1990). See also, State of Ohio v. EPA, 997 F.2d 1520 (D.C. Cir. 1993), which upholds EPA's application of MCLs and non-zero MCLGs as ARAR standards for groundwater which is a potential drinking water source.

As noted earlier, standards such as the MCL and MCLG standards are promulgated pursuant to both federal and state law. Under the Safe Drinking Water Act, EPA has granted the State of Montana primacy in implementation of the Safe Drinking Water Act. The State has promulgated its own public water supply ground water standards through the Public Water Safety Act for most contaminants of concern, primarily through incorporation by reference of the federal standard. These standards are also identified here.

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<sup>9</sup> The Technical Impracticability ARAR waiver would also apply to the prohibition on the disposal or storage of tailings/mine wastes/toxic or hazardous materials in the floodplain to the extent that any part of the remedial action for wastes left in place in the floodplain would constitute the active management or storage of those wastes



<u>Chemical</u>	<u>MCLG</u>	<u>MCL</u>
Arsenic	NA	10 ug/l <sup>10</sup>
Cadmium	5 ug/l <sup>11</sup>	5 ug/l <sup>12</sup>
Copper	1300 ug/l <sup>13</sup>	1300 ug/l <sup>14</sup>
Lead	NA <sup>15</sup>	15 ug/l <sup>16</sup>
Mercury	2 ug/l	2 ug/l

These standards incorporate potentially relevant and appropriate Resource Conversation Act (RCRA) standards for groundwater ground at 40 CFR Part 264, Subpart F, which is incorporated pursuant to state law at ARM 17.54.702. The RCRA standards are the same or less stringent than the MCLs or MCLGs identified above.

B. Surface Water - Ambient and Point Source Discharges - Clean Water Act. (Applicable or Relevant and Appropriate)

CERCLA and the NCP provide that federal water pollution criteria that match designated or anticipated surface water uses are the usual surface water standards to be used at Superfund cleanups, as relevant and appropriate standards, unless the state has promulgated surface water quality standards pursuant to the delegated state water quality act. The State of Montana has designated uses for Silver Bow Creek, and has promulgated specific numeric water quality standards accordingly. Those standards as well as other surface water standards are included in the State ARARs identified below. These standards will be applied to all chemicals of concern identified in the BPSOU remedial investigation, both to point sources affected or created

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<sup>10</sup> See 66 FR 6976 (January 22, 2001) and 66 FR 28341 - 28350 (May 22, 2001); 40 CFR § 141.11 and 40 CFR § 141.62

<sup>11</sup> 40 CFR § 141.51

<sup>12</sup> 40 CFR § 141.62

<sup>13</sup> 40 CFR § 141.51

<sup>14</sup> 40 CFR § 141.80(c) The requirement is an action level rather than a simple numerical standard

<sup>15</sup> The MCLG for lead is zero, which is not an appropriate standard for Superfund site cleanups

<sup>16</sup> 40 CFR § 141.80(c) The requirement is an action level rather than a simple numerical standard



by the BPSOU cleanup and to ambient water in the BPSOU. If State standards are changed to be less stringent than existing Federal Water Quality Criteria (FWQC), then FWQC will be identified as the appropriate ARARs. FWQC may also become replacement standards for State standards if appropriate waivers are invoked for the state standards. The FWQC standards are identified here.

<u>Chemical</u>	<u>FWQC<sup>17</sup> CMC (acute)</u>	<u>FWQC CCC (chronic)</u>
Aluminum	750 ug/l	87 ug/l (pH 6.5 - 9.0, Non-Priority Pollutant)
Arsenic	340 ug/l	150 ug/l
Cadmium	4.3 ug/l	2.2 ug/l
Copper	13 ug/l	9.0 ug/l
Iron	NA	1000 ug/l (Non-Priority Pollutant)
Lead	65 ug/l	2.5 ug/l
Mercury	1.4 ug/l	0.77 ug/l
Silver	3.4 ug/l	NA
Zinc	120 ug/l	120 ug/l

C. Surface Water - Point Source Discharges - Stormwater Regulations - Clean Water Act. (Applicable)

If point sources of water contamination are retained or created by any BPSOU remediation activity, applicable Clean Water Act standards would apply to those discharges. These include the general requirements and storm water regulations found at 40 CFR Parts 122 and 125 (general conditions and industrial activity conditions). The storm water regulations address non-agricultural sources of storm water discharges which adversely affect water quality. Generally, the permits require the permittee to implement Best Management Practices (BMP) and to take all reasonable steps to minimize or prevent any discharge which has a reasonable likelihood of adversely affecting human health or the environment.<sup>18</sup> However, if there is evidence indicating potential or realized impacts on water quality due to any storm water discharge associated with the activity, substantive standards associated with an individual National Pollutant Discharge Elimination System (NPDES) permit or alternative general permit

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<sup>17</sup> Pursuant to Section 304(a) of the Clean Water Act. National Recommended Water Quality Criteria- Correction US EPA, EPA 822-Z-99-001, April 1999

<sup>18</sup> For further explanation of storm water applications, see the letter from EPA to Chuck Stilwell, ARCO, dated February 2, 1999, which describes that treatment, in addition to BMPs, may be necessary if in-stream standards are not met after implementation of BMPs



may be required (or Montana Pollutant Discharge Elimination System (MPDES) permit or alternative general permit under the State program).

D. Air Standards - Clean Air Act (Applicable)

Federal air quality standards are not currently exceeded in the BPSOU. Limitations on air emissions resulting from cleanup activities or emissions resulting from wind erosion of exposed hazardous substances are set forth in the action specific requirements, below.

II. FEDERAL LOCATION SPECIFIC REQUIREMENTS

A. Fish and Wildlife Coordination Act (Applicable)

These standards are found at 16 U.S.C. §§ 661 et seq. and 40 CFR § 6.302(g). They require that federally funded or authorized projects ensure that any modification of any stream or other water body affected by a federally funded or authorized action provide for adequate protection of fish and wildlife resources. Compliance with this ARAR necessitates EPA consultation with the U.S. Fish and Wildlife Service (USFWS) and the State of Montana Department of Fish, Wildlife, and Parks. Further consultation with these agencies will occur during cleanup selection and implementation, and specific mitigative or other measures may be identified to achieve compliance with this ARAR, if streambank or streambed measures are chosen. The purpose of consultation is to develop measures to prevent, mitigate, or compensate for project-related losses to fish and wildlife. Mitigative measures must be performed by the persons who implement any selected remedy.

B. Floodplain Management Order (Applicable)

This requirement (40 CFR Part 6, Appendix A, Executive Order No. 11,988) mandates that federally funded or authorized actions within the 100 year floodplain avoid, to the maximum extent possible, adverse impacts associated with development of a floodplain. Compliance with this requirement is detailed in EPA's August 6, 1985 "Policy on Floodplains and Wetlands Assessments for CERCLA Actions." If the selected remedial action adversely impacts the Silver Bow Creek floodplain, specific measures to minimize adverse impacts may be identified following EPA consultation with the appropriate agencies.

In addition, if the remedial action selected for the BPSOU is found to potentially adversely impact the floodplain, the



following information will be produced: a Statement of Findings which will set forth the reasons why the proposed action must be located in or affect the floodplain; a description of significant facts considered in making the decisions to locate in or affect the floodplain or wetlands including alternative sites or actions; a statement indicating whether the selected action conforms to applicable state or local floodplain protection standards; a description of the steps to be taken to design or modify the proposed action to minimize the potential harm to or within the floodplain; and a statement indicating how the proposed action affects the natural or beneficial values of the floodplain.

#### C. Protection of Wetlands Order (Applicable)

This requirement (40 CFR Part 6, Appendix A, Executive Order No. 11,990) mandates that federal agencies and potentially responsible parties (PRPs) avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practicable alternative exists. Section 404(b)(1), 33 U.S.C. § 1344(b)(1), also prohibits the discharge of dredged or fill material into waters of the United States. Together, these requirements create a "no net loss" of wetlands standard.

Compliance with this ARAR will be achieved through EPA consultation with the U.S. Fish and Wildlife Service, to determine the existence and category of wetlands present at the site, and any avoidance or mitigation and replacement which may be necessary. Avoidance, mitigation, or replacement activities will be done by the persons who implement any selected remedy. Avoidance or mitigation and replacement of wetlands must be addressed in remedy selection and implementation. In July 1993, ARCO published a report titled "Wetlands and Threatened/Endangered Species Inventory with Determination of Functionally Effective Wetland Area" EPA also approved ARCO's August 1992 Evaluation Form for Determining Wetland Functional Value and Effective Wetland Area in Upper Clark Fork River superfund Sites for use in wetland evaluations.

#### D. The Endangered Species Act (Applicable)

This statute and implementing regulations (16 U.S.C. §§ 1531 - 1544, 50 CFR Part 402, and 40 CFR § 6.302(h)) require that any federal activity or federally authorized activity may not jeopardize the continued existence of any threatened or endangered species known to live or to have lived in the affected environment or destroy or adversely modify a critical habitat.



This ARAR requires EPA to ensure that the selected remedy is sufficiently protective of the environment containing the threatened or endangered species, with an emphasis on reducing the risks from the contaminants of concern to the listed species described in the EPA risk assessment to an acceptable level, with consideration given to the special status of the listed or threatened species - see 40 CFR Sections 300.430(d)(2)(vii) and (e)(2)(i)(G) and EPA Guidance Document OSWER Dir. No. 9285.7-28P, Ecological Risk Assessment and Risk Management principles for Superfund Sites (October, 1999) page 3; and to ensure that the selected remedy is implemented in a manner that effects on any existing the threatened or endangered species from the active remedy implementation activities are avoided or mitigated - see page 4-12 of the CERCLA Compliance with Other Laws Manual: Volume II (EPA August 1989).

Compliance with this ARAR has to date involved consultation with USFWS, and a determination of the presence of listed or proposed species or critical habitats present at the BPSOU. The USFWS has indicated that general and informal consultation only is required for this ARAR at this operable unit, and that a full biological assessment and biological opinion will not be necessary. In July 1993, ARCO published a report titled "Wetlands and Threatened/Endangered Species Inventory with Determination of Functionally Effective Wetland Area". The bald eagle and the peregrine falcon were identified as potentially occurring at the BPSOU. Subsequently, the bull trout was listed by the FWS as a threatened species.

#### E. The National Historic Preservation Act (Applicable)

This statute and implementing regulations (16 U.S.C. § 470 et seq., 40 CFR § 6.301(b), 36 CFR Part 800) require federal agencies or federal projects to take into account the effect of any federally assisted undertaking or licensing on any district, site building, structure, or object that is included in, or eligible for, the Register of Historic Places. If effects cannot be avoided reasonably, measures should be implemented to minimize or mitigate the potential effect. In addition, Indian cultural and historical resources must be evaluated, and effects avoided, minimized, or mitigated.

Compliance with this ARAR has been described in the First and Second Programmatic Agreements (Programmatic Agreement, April 6, 1992 and Second Programmatic Agreement, December 14, 1994) and various mitigative and replacement measures have been undertaken under those agreements. The Second Programmatic Agreement also describes a notification and consultation process, which must be



observed during remedial design and remedial action activities at BPSOU. The Salish and Kootenai Confederated Tribe (the Tribe) is currently cataloguing protected Indian resources, in partial compliance with this ARAR, and additional consultation measures may be required involving the Tribe.

F. Archaeological and Historic Preservation Act  
(Applicable)

The statute and implementing regulations (16 U.S.C. § 469 et seq., 40 CFR § 6.301(c)) establish requirements for evaluation and preservation of historical and archaeological data, including Indian cultural and historic data, which may be destroyed through alteration of terrain as a result of federal construction projects or a federally licensed activity or program. If eligible scientific, prehistorical, or archaeological data are discovered during site activities, they must be preserved in accordance with these requirements.

G. Historic Sites, Buildings, and Antiquities Act  
(Applicable)

This statute and implementing regulations (16 U.S.C. § 461 et seq., 40 CFR § 6.310(a)) state that in conducting an environmental review of a proposed EPA action, the responsible official shall consider the existence and location of natural landmarks using information provided by the National Park Service pursuant to 36 CFR § 62.6(d) to avoid undesirable impacts upon such landmarks.

H. Migratory Bird Treaty (Applicable)

This requirement (16 U.S.C. §§ 703 et seq.) establishes a federal responsibility for the protection of the international migratory bird resource and requires continued consultation by EPA with the USFWS during remedial design and remedial construction to ensure that the cleanup of the site does not unnecessarily impact migratory birds. Specific mitigative measures may be identified for compliance with this requirement as appropriate for performance by the persons who implement the remedy.

I. Bald Eagle Protection Act (Applicable)

This requirement (16 U.S.C. §§ 668 et seq.) establishes a federal responsibility for protection of bald and golden eagles, and requires continued consultation by EPA with the USFWS during remedial design and remedial construction to ensure that any cleanup of the site does not unnecessarily adversely affect the



bald and golden eagle. Specific mitigative measures may be identified for compliance with this requirement as appropriate, and will be done by the persons who implement any selected remedy.

J. Resource Conservation and Recovery Act  
(Relevant and Appropriate)

Any discrete waste units created or actively managed by the BPSOU site cleanup must comply with the siting restrictions and conditions at 40 CFR § 264.18 (a) and (b). These sections require management units to be designed, constructed, operated, and maintained to avoid washout, if they are within or near the current 100 year flood plain.

K. Native American Grave Protection and Repatriation Act, 25 U.S.C. § 3001; 43 CFR §§ 10.1 - 10.17 (Applicable or Relevant and Appropriate)

NAGPRA and its implementing regulations provide for the disposition of Native American remains and objects inadvertently discovered on federal or tribal lands after November, 1990. 25 U.S.C. Section 3002(d). If the response activities result in the discovery of Native American human remains or related objects, the activity must stop while the head of the federal land management agency (if federal lands are involved) and appropriate Indian tribes are notified of the discovery. After the discovery, the response activity must cease and a reasonable effort must be made to protect the Native American human remains or related objects. The response activity may later resume. 42 CFR Section 10.4. Accordingly, depending on the facts of the discovery and the location of the response action, NAGPRA could be applicable or relevant and appropriate to the response action.

III. FEDERAL ACTION SPECIFIC REQUIREMENTS

A. Solid Waste (Applicable), Surface Mining Control and Reclamation (Relevant and Appropriate), and RCRA (Relevant and Appropriate) Requirements

The contamination at the BPSOU is primarily mining waste from mining mills and smelters in Butte. This waste may not be RCRA hazardous waste, although EPA reserves its rights to make a more formal determination in this regard at a later date. For any active management (i.e., treatment, storage, disposal, grading,



or in-situ treatment) or removal of tailings or mixed tailings and soils<sup>19</sup> contamination, the following requirements are ARARs.

1. Requirements described at 40 CFR §§ 257.3-1(a), 257.3-3, and 257.3-4, governing waste handling, storage, and disposal, including retention of the waste, in general<sup>20</sup>, and 257.3-5, relating to precautions necessary to ensure that cadmium is not taken up into crops, including pasture grasses that may enter the food chain.

2. For any discrete waste units which are created or actively managed by the BPSOU cleanup, reclamation and closure regulations found at 30 CFR Parts 816 and 784, governing coal and to a lesser extent, non-coal mining, are relevant and appropriate requirements<sup>21</sup>.

3. RCRA regulations found at 40 CFR §§ 264.116 and .119 (governing notice and deed restrictions), 264.228(a)(2)(ii) (addressing de-watering of wastes prior to disposal), and 264.228(a)(2)(iii)(B), (C), and (D) and .251(c), (d), and (f) (regarding run-on and run-off controls), are relevant and appropriate requirements for any waste management units created or actively managed at the BPSOU<sup>22</sup>.

#### B. Air Standards - Clean Air Act (Applicable)

These standards, promulgated pursuant to section 109 of the Clean Air Act<sup>23</sup>, are applicable to releases into the air from any BPSOU cleanup activities.

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<sup>19</sup> Federal and State solid waste requirements would be relevant and appropriate for contaminated soils if these materials are not used in conjunction with other removal or remedial measures such as deep plowing.

<sup>20</sup> Solid waste regulations are promulgated pursuant to the federal Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, 42 U S C §§ 6901 et seq. They are applicable regulations, although the State of Montana has the lead role in regulating solid waste disposal in the State of Montana.

<sup>21</sup> The Surface Mining Control and Reclamation Act is promulgated at 30 U S C §§ 1201 - 1326.

<sup>22</sup> As noted earlier, federal RCRA regulations are incorporated by reference into applicable State Hazardous Waste Management Act regulations. See ARM 17 53 801. Use of select RCRA regulations for mining waste cleanups is appropriate when discrete units are addressed by a cleanup and site conditions are distinguishable from EPA generic determination of low toxicity/high volume status for mining waste. See Preamble to the Final NCP, 55 Fed Reg 8763 - 8764 (March 8, 1990), CERCLA Compliance with Other Laws Manual, Volume II (August 1989 OSWER Directive #9234 1-02) p 6-4, Preamble to the Proposed NCP, 53 Fed Reg 51447 (Dec 21, 1988), and guidance entitled Consideration of RCRA Requirements in Performing CERCLA Responses at Mining Wastes Sites, August 19, 1986 (OSWER).

<sup>23</sup> 42 U S C §§ 7401 et seq.



1. Lead: No person shall cause or contribute to concentrations of lead in the ambient air which 3 exceed 1.5 micrograms per cubic meter (ug/m ) of air, measured over a 90-day average. These standards are promulgated at ARM 17.8.222 as part of a federally approved State Implementation Plan (SIP), pursuant to the Clean Air Act of Montana, §§ 75-2-101 et seq. MCA. Corresponding federal regulations are found at 40 CFR § 50.12<sup>24</sup>.

2. Particulate matter that is 10 microns in diameter or smaller (PM-10): No person shall cause or contribute to concentrations of PM-10 in the ambient air which exceed:

- 150 ug/m3 of air, 24 hour average, no more than one expected exceedance per calendar year;
- 50 ug/m3 of air, annual average.

These regulations are promulgated at ARM 17.8.223 as part of a federally approved SIP, pursuant to the Clean Air Act of Montana, §§ 75-2-101 et seq. MCA. Corresponding federal regulations are found at 40 CFR § 50.6.

Ambient air standards under section 109 of the Clean Air Act are also promulgated for carbon monoxide, hydrogen sulfide, nitrogen dioxide, sulfur dioxide, and ozone. If emissions of these compounds were to occur at the site in connection with any cleanup action, these standards would also be applicable. See ARM 17.8.222 and .223, and 40 CFR Part 50.

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<sup>24</sup> Ambient air standards established as part of Montana's approved State Implementation Plan in many cases provide more stringent or additional standards. The federal standards by themselves apply only to major sources, while the State standards are fully applicable throughout the state and are not limited to major sources. See ARM 17.8.205 and 17.8.212-223. As part of an EPA approved State Implementation Plan, the state standards are also federally enforceable. Thus, the state standards which are equivalent to the federal standards are identified in this section. A more detailed list of State standards, which include standards which are not duplicated in federal regulations, is contained in the State ARAR identification section.



C. Point Source Controls - Clean Water Act (Applicable)

If point sources of water contamination are retained or created by any BPSOU remediation activity, applicable Clean Water Act standards would apply to those discharges. The regulations are discussed in the contaminant specific ARAR section, above, and in the State of Montana identification of ARARs. These regulations would include storm water runoff regulations found at 40 CFR Parts 121, 122, and 125 (general conditions and industrial activity conditions). These would also include requirements for best management practices and monitoring found at 40 CFR §§ 122.44(1) and 440.148, for point source discharges.

D. Dredge and Fill Requirements (Applicable)

Regulations found at 40 CFR Part 230 address conditions or prohibitions against depositing dredge and fill material into water of the United States. If remediation activities would result in an activity subject to these regulations, they would be applicable. Compliance with this requirement will be achieved at the site of dredge and fill activity within the BPSOU during construction activities.

E. Underground Injection Control (Applicable)

Requirements found at 40 CFR Part 144, promulgated pursuant to the Safe Drinking Water Act, allow the re-injection of treated groundwater into the same formation from which it was withdrawn for aquifers such as the aquifer beneath the reservoir sediments operable unit, and addresses injection well construction, operation, maintenance, and capping/closure. These regulations would be applicable to any reinjection of treated groundwater.

F. Transportation of Hazardous or Contaminated Waste  
(Relevant and Appropriate)

40 CFR Part 263 establishes regulations for the transportation of hazardous waste. These regulations would govern any on-site transportation of contaminated material. Any off-site transportation would be fully subject to applicable regulations and permitting.



## STATE OF MONTANA ARARS

As provided by Section 121 of CERCLA, 42 U.S.C. § 9621, only those state standards that are more stringent than any federal standard and that have been identified by the state in a timely manner are appropriately included as ARARs. DEQ has identified some state standards that are potentially duplicative of federal standards to ensure their timely identification and consideration in the event that they are not identified or retained in the federal ARARs. Duplicative or less stringent standards will be deleted as appropriate when the final determination of ARARs is presented.

### IV. MONTANA CONTAMINANT SPECIFIC REQUIREMENTS

#### A. Water Quality

##### 1. Surface Water Quality Standards (Applicable)

Under the Montana Water Quality Act, §§ 75-5-101 et seq., MCA, the state has promulgated water quality standards to protect, maintain, and improve the quality and potability of the state's surface water for water supplies, wildlife, fish and aquatic life, agricultural, industry, recreation, and other beneficial uses. The requirements listed below are applicable water quality standards with which any remedial action must comply.

ARM 17.30.607(1)(a)(iii)(Applicable) provides that Silver Bow Creek (mainstem) from the confluence of Blacktail Creek to Warm Springs Creek is classified "I" for water use. Waters in the operable unit that are not specifically listed under 17.30.607(1)(a), for example, Blacktail Creek, are classified B-1.

The "I" classification standards are contained in ARM 17.30.628 (Applicable) of the Montana water quality regulations. This section states:

[T]he goal of the state of Montana is to have these waters fully support the following uses: drinking, culinary, and food processing purposes after conventional treatment; bathing, swimming, and recreation; growth and propagation of fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply.



These beneficial uses are considered supported when the concentrations of toxic, carcinogenic, or harmful parameters in these waters do not exceed the applicable standards specified in department Circular DEQ-7 when stream flows equal or exceed the stream flows specified in ARM 17.30.635(4) (10-year 7-day low flow, i.e., minimum consecutive 7-day average flow which may be expected to occur on the average of once in 10 years).<sup>25</sup> These standards set the contaminant specific requirement for ambient water quality in the stream.

To allow a gradual attainment of these requirements in already impacted streams, the I classification allows point source discharges to be permitted at the higher concentration of (1) the applicable standards specified in department Circular DEQ-7, (2) the site-specific standards, or (3) one-half of the mean in-stream concentrations immediately upstream of the discharge point. This effectively requires eventual attainment of the Circular DEQ-7 levels in the stream, while allowing consideration of the current, impacted stream quality (a graduated reduction of point source discharge concentrations based on the mean in-stream concentration where the stream is substantially degraded). As the quality of the stream improves due to control of other sources, including cleanup of non-point source areas, point source dischargers must improve the quality of their discharges down to the in-stream standards (either DEQ-7 or, for aquatic life only, site specific standards).

ARM 17.30.623 (Applicable) requires that waters classified B-1 are to be maintained suitable for drinking, culinary and food processing purposes after conventional treatment, bathing, swimming and recreation, growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers, and agricultural and industrial water supply.

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<sup>25</sup> Alternatively, site-specific criteria may be developed using the procedures given in the Water Quality Standards Handbook, Second Edition (EPA-823-B-94-005a), provided that other routes of exposure to toxic parameters by aquatic life are addressed. Such other routes of exposure in this operable unit would include, for example, contaminated sediment/food chain routes of exposure. However, no site specific standards have been developed for Silver Bow Creek to date, and the applicable numeric standards are those set forth in DEQ-7.



This section provides that concentrations of carcinogenic, bioconcentrating, toxic or harmful parameters which would remain in water after conventional water treatment may not exceed standards set forth in department circular DEQ-7. Discharges may not cause receiving water concentrations to exceed the applicable standards specified in DEQ-7 when stream flows equal or exceed the design flows specified in ARM 17.30.635(4) and also must conform with ARM Title 16, Chapter 20, Subchapter 7 (the nondegradation rules).

The B-1 classification standards at ARM 17.30.623 also include the following criteria: 1) dissolved oxygen concentration must not be reduced below the levels given in department circular DEQ-7; 2) induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 8.5 must be less than 0.5 pH unit. Natural pH outside of this range must be maintained without change. Natural pH above 7.0 must be maintained above 7.0; 3) the maximum allowable increase above naturally occurring turbidity is 5 nephelometric turbidity units except as permitted in 75-5-318, MCA; 4) temperature increases must be kept within limits prescribed in this section; 5) no increases above naturally occurring concentrations of sediment or suspended sediment, settleable solids, oils, floating solids, which will or are likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish or other wildlife are allowed; 6) true color must not be increased more than five units above naturally occurring color.

To the extent any of these standards are violated due to hazardous substances or Superfund response action, they must be complied with as part of any selected remedial action.

With respect to the remediation of non-point sources, the DEQ-7 standards effectively set the ambient water quality standards that are to be attained by the remedial action. As an ambient standard, the point of compliance for these standards would be throughout the stream, and compliance should be measured by monitoring at several different points within the stream, as determined by any significant point sources or significant reaches of non-point sources.

For the primary contaminants of concern, the DEQ-7 levels are listed below. DEQ-7 provides that "whenever both Aquatic Life Standards and Human Health Standards exist for the same analyte, the more restrictive of these values will be used as the numeric Surface Water Quality Standard." Surface water is measured in total recoverable form, according to DEQ-7.



<u>Chemical</u>	<u>DEQ-7<sup>26</sup> Standards (total recoverable form, except as noted)</u>
Aluminum (dissolved)	750 ug/l acute (pH 6.5-9.0) 87 ug/l chronic (pH 6.5-9.0)
Arsenic	340 µg/l acute 150 ug/l chronic 10 ug/l human health
Cadmium	0.52 ug/l @ 25 mg/l hardness acute 0.097 ug/l @ 25 mg/l hardness chronic 5 ug/l human health
Copper	3.79 ug/l @ 25 mg/l hardness acute 2.85 ug/l @ 25 mg/l hardness chronic 1300 ug/l human health
Iron	1000 ug/l chronic
Lead	13.98 ug/l @ 25 mg/l hardness acute 0.545 µg/l @ 25 mg/l hardness chronic 15 ug/l human health
Mercury	1.7 ug/l acute 0.91 ug/l chronic 0.05 µg/l human health
Silver	0.374 ug/l @ 25 mg/l hardness NA acute
Zinc	37 ug/l @ 25 mg/l hardness acute and chronic

I classification standards also include the following criteria:

1. Dissolved oxygen concentration must not be reduced below 3.0 milligrams per liter.
2. Hydrogen ion concentration (pH) must be maintained within the range of 6.5 to 9.5.

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<sup>26</sup> Circular DEQ-7, Montana Numeric Water Quality Standards, February 2006 See note 12 in DEQ-7 for an explanation of how the standards are a function of total hardness in mg/l CaCO<sub>3</sub>



3. No increase in naturally occurring turbidity, temperature, concentrations of sediment or suspended sediment, settleable solids, oils, floating solids, or true color is allowed which will or is likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish or other wildlife.
4. No discharges of toxic, carcinogenic, or harmful parameters may commence or continue which lower or are likely to lower the overall water quality of these waters.

Additional restrictions on any discharge to surface waters are included in:

ARM 17.30.637 (Applicable), which prohibits discharges containing substances that will:

- (a) settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines;
- (b) create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 milligrams per liter) or globules of grease or other floating materials;
- (c) produce odors, colors or other conditions which create a nuisance or render undesirable tastes to fish flesh or make fish inedible;
- (d) create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life;
- (e) create conditions which produce undesirable aquatic life.

ARM 17.30.637 states that no waste may be discharged and no activities conducted which, either along or in combination with other waste activities, will cause violation of surface water quality standards.

ARM 17.30.637 also provides that leaching pads, tailing ponds, or water, waste, or product holding facilities must be located, constructed, operated and maintained in such a manner and of such materials to prevent any discharge, seepage, drainage, infiltration, or flow which may result in pollution of state waters, and a monitoring system may be required to ensure such compliance.



ARM 17.30.705 provides that for any surface water, existing and anticipated uses and the water quality necessary to protect these uses must be maintained and protected unless degradation is allowed under the non-degradation rules at ARM 17.30.701 et seq.

ARM 17.30.1203 (Applicable), which adopts and incorporates the provisions of 40 C.F.R. Part 125 for criteria and standards for the imposition of technology-based treatment requirements in MPDES permits. Although the permit requirement would not apply to on-site discharges, the substantive requirements of Part 125 are applicable, i.e., for toxic and non-conventional pollutants treatment must apply the best available technology economically achievable (BAT); for conventional pollutants, application of the best conventional pollutant control technology (BCT) is required. Where effluent limitations are not specified for the particular industry or industrial category at issue, BCT/BAT technology-based treatment requirements are determined on a case by case basis using best professional judgment (BPJ). See CERCLA Compliance with Other Laws Manual, Vol. I, August 1988, p. 3-4 and 3-7.

Applicable for both surface water and ground water, § 75-5-605, MCA, provides that it is unlawful to cause pollution as defined in 75-5-103 of any state waters or to place or cause to be placed any wastes where they will cause pollution of any state waters. Applicable for both surface water and ground water, § 75-5-303, MCA, states that existing uses of state waters and the level of water quality necessary to protect the uses must be maintained and protected.

Section 75-5-308, MCA, allows DEQ to grant short-term exemptions from the water quality standards or short-term use that exceeds the water quality standards for the purpose of allowing certain emergency environmental remediation activities. Such exemptions typically extend for a period of 30-60 days. However, any exemption must include conditions that minimize to the extent possible the magnitude of the violation and the length of time the violation occurs. In addition, the conditions must maximize the protection of state waters by ensuring the maintenance of beneficial uses immediately after termination of the exemption. Water quality and quantity monitoring and reporting may also be included as conditions.



Montana Pollutant Discharge Elimination System (MPDES) - stormwater and other point sources.

ARM 17.30.1342 - 1344 set forth the substantive requirements applicable to all MPDES permits. The substantive requirements, including the requirement to properly operate and maintain all facilities and systems of treatment and control are applicable requirements.

Under ARM 17.30.601, ARM 17.30.1101 et seq., and ARM 17.30.1301 et seq., the Montana Department of Environmental Quality has issued general stormwater permits for certain activities. Generally, the permits require the permittee to implement Best Management Practices (BMP) and to take all reasonable steps to minimize or prevent any discharge which has a reasonable likelihood of adversely affecting human health or the environment.<sup>27</sup> However, if there is evidence indicating potential or realized impacts on water quality due to any storm water discharge associated with the activity, the substantive standards associated with an individual Montana Pollutant Discharge Elimination System (MPDES) permit or alternative general permit may be required. The substantive requirements of the following permits are applicable for the following activities:

For construction activities: General Permit for Storm Water Discharges Associated with Construction Activity, Permit No. MTR 100000 (June 8, 2002);

For mining activities: General Permit for Storm Water Discharges Associated with Mining and with Oil and Gas Activities, Permit No. MTR300000 (November 17, 2002)<sup>28</sup>;

For industrial activities: General Permit for Storm Water Discharges Associated with Industrial Activity, Permit No. MTR000000 (October 1, 2001).

Generally, the permits listed above require the permittee to implement Best Management Practices (BMP) and to take all reasonable steps to minimize or prevent any discharge which has a reasonable likelihood of adversely affecting human health or the

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<sup>27</sup> For further explanation of storm water applications, see the letter from EPA to Chuck Stilwell, ARCO, dated February 2, 1999, which describes that treatment, in addition to BMPs, may be necessary if in-stream standards are not met after implementation of BMPs

<sup>28</sup> This permit covers point source discharges of storm water from mining and milling activities (including active, inactive, and abandoned mine and mill sites) including activities with Standard Industrial Code 14 (metal mining)



environment.<sup>29</sup> However, if there is evidence indicating potential or realized impacts on water quality due to any storm water discharge associated with the activity, the substantive standards associated with an individual MPDES permit or alternative general permit may be required.

A related mine reclamation requirement is set out in ARM 17.24.633 (relevant and appropriate), which requires that all surface drainage from disturbed areas that have been graded, seeded or planted must be treated by the best technology currently available (BTCA) before discharge. Sediment control through BTCA practices must be maintained until the disturbed area has been reclaimed, the revegetation requirements have been met, and the area meets state and federal requirements for the receiving stream.

## 2. Groundwater Water Standards

As noted above, EPA has waived all ground water standard within the zone defined in the final BPSOU TI Evaluation document (EPA 2006), pursuant to its authority under CERCLA. The following standards apply outside of the TI waiver zone.

In addition to the standards set forth below, relevant and appropriate MCLs and MCLGs are included in the federal ARARs identified above.

### a. Montana Maximum Contaminant Levels (relevant and appropriate)

Pursuant to the Public Water Safety Act, 75-6-101 et seq. MCA and ARM 17.28.203, the MCLS specified in 40 CFR Part 141 (Primary Drinking Water Standards) are incorporated by reference into State law.

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<sup>29</sup> For further explanation of storm water applications, see the letter from EPA to Chuck Stilwell, ARCO, dated February 2, 1999, which describes that treatment, in addition to BMPs, may be necessary if in-stream standards are not met after implementation of BMPs



## b. Groundwater Quality Standards (Applicable)

ARM 17.30.1006 classifies groundwater into Classes I through IV based upon the its specific conductance and establishes the groundwater quality standards applicable with respect to each groundwater classification. Based upon its specific conductance, the majority of the groundwater in the defined alluvial aquifer of the BPSOU is considered Class I or Class II groundwater.<sup>30</sup>

Concentrations of substances in Class I and Class II groundwater may not exceed the human health standards for groundwater listed in department Circular DEQ-7. For the primary chemicals of concern these levels are listed below.

For concentrations of parameters for which human health standards are not listed in DEQ-7, ARM 17.30.1006 allows no increase of a parameter to a level that renders the waters harmful, detrimental or injurious to listed beneficial uses. For Class I and II groundwaters, 17.30.1006 also allows no increase of a parameter that causes a violation of the nondegradation provisions of § 75-5-303, MCA.

ARM 17.30.1006 (Applicable) establishes the groundwater quality standards applicable with respect to each groundwater classification. Concentrations of dissolved substances in Class I or II groundwater (or Class III groundwater which is used as a drinking water source) may not exceed the human health standards listed in department Circular DEQ-7. For the primary contaminants of concern these levels are listed below. Ground water is measured in dissolved form, according to DEQ-7.

Chemical DEQ-7 Human Health Standards

Arsenic	20 ug/l
Cadmium	5 ug/l
Copper	1300 ug/l
Lead	15 ug/l
Mercury	2 ug/l
Zinc	2000 ug/l

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<sup>30</sup> ARM 17 30 1006 provides that Class I groundwaters are those with specific conductance of less than 1000 microSiemens per centimeter at 25° C, Class II groundwaters 1000 to 2500, Class III groundwaters 2500 to 15,000, and Class IV groundwaters over 15,000



ARM 17.30.1011 provides that groundwater whose existing quality is higher than the standard for its classification must be maintained at that high quality unless degradation may be allowed under the principles established in § 75-5-303, MCA, and the nondegradation rules at ARM 17.30.701 et seq.

An additional concern with respect to ARARs for groundwater is the impact of groundwater upon the surface water. If significant loadings of contaminants from groundwater sources to Silver Bow Creek or other surface water contribute to the inability of the surface water to meet its class standards, then alternatives to alleviate such groundwater loading must be evaluated and, if appropriate, implemented. Groundwater in certain areas may need to be remediated to levels more stringent than the groundwater classification standards in order to achieve the standards for affected surface water. See Compliance with Federal Water Quality Criteria, OSWER Publication 9234.2-09/FS (June 1990) ["Where the ground water flows naturally into the surface water, the groundwater remediation should be designed so that the receiving surface-water body will be able to meet any ambient water-quality standards (such as State WQSs or FWQC) that may be ARARs for the surface water."].

#### B. Air Quality

In addition to the standards identified in the federal action specific ARARs above, the State of Montana has identified certain air quality standards in the action-specific section of the State ARARs below.

### V. MONTANA LOCATION SPECIFIC REQUIREMENTS

#### A. Floodplain and Floodway Management Act and Regulations (Applicable)

The Floodplain and Floodway Management Act and regulations specify types of uses and structures that are allowed or prohibited in the designated 100-year floodway<sup>31</sup> and floodplain<sup>32</sup>.

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<sup>31</sup> The floodway is the channel of a watercourse or drainway and those portions of the floodplain adjoining the channel which are reasonably required to carry and discharge the floodwater of the water course or drainway. ARM 36 15 101(13)

<sup>32</sup> The floodplain is the area adjoining the water course or drainway which would be covered by the floodwater of a base (110 year) flood except for sheet flood areas that receive less than one foot of water per occurrence. The floodplain consists of the floodway and flood fringe. ARM 36 15 101



These standards are applicable to all actions contemplated for this site within the floodplain.

1. Allowed Uses. The law recognizes certain uses as allowable in the floodway and a broader range of uses as allowed in the floodplain. Residential use is among the possible allowed uses expressly recognized in both the floodway and floodplain. "Residential uses such as lawns, gardens, parking areas, and play areas," as well as certain agricultural, industrial-commercial, recreational and other uses are permissible within the designated floodway, provided they do not require structures other than portable structures, fill or permanent storage of materials or equipment. 76-5-401, MCA; ARM 36.15.601.<sup>33</sup> In addition, in the flood fringe (i.e., within the floodplain but outside the floodway), residential, commercial, industrial, and other structures may be permitted subject to certain conditions relating to placement of fill, roads, floodproofing, etc. § 76-5-402, MCA; ARM 36.15.701. Domestic water supply wells may be permitted, even within the floodway, provided the well casing is watertight to a depth of 25 feet and the well meets certain conditions for floodproofing, sealing, and positive drainage away from the well head. ARM 36.15.602(6).

2. Prohibited Uses Uses prohibited anywhere in either the floodway or the floodplain are:

- a. solid and hazardous waste disposal; and
- b. storage of toxic, flammable, hazardous, or explosive materials.

ARM 36.15.605(2) and 36.15.703.

In the floodway, additional prohibitions apply, including prohibition of:

- a. a building for living purposes or place of assembly or permanent use by human beings;
- b. any structure or excavation that will cause water to be diverted from the established floodway, cause erosion, obstruct the natural flow of water, or reduce the carrying capacity of the floodway; and

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<sup>33</sup> However, see EPA's 1997 Human Health Risk Assessment for a determination of likely land use at the CFR OU, based on local zoning requirements and other factors



- c. the construction or permanent storage of an object subject to flotation or movement during flood level periods.

Section 76-5-403, MCA.

3. Applicable considerations in use of floodplain or floodway

Applicable regulations also specify factors that must be considered in allowing diversions of the stream, changes in place of diversion of the stream, flood control works, new construction or alteration of artificial obstructions, or any other nonconforming use within the floodplain or floodway. Many of these requirements are set forth as factors that must be considered in determining whether a permit can be issued for certain obstructions or uses. While permit requirements are not directly applicable to remedial actions conducted entirely on site, the substantive criteria used to determine whether a proposed obstruction or use is permissible within the floodway or floodplain are applicable standards. Factors which must be considered in addressing any obstruction or use within the floodway or floodplain include:

1. the danger to life and property from backwater or diverted flow caused by the obstruction or use;
2. the danger that the obstruction or use will be swept downstream to the injury of others;
3. the availability of alternate locations;
4. the construction or alteration of the obstruction or use in such a manner as to lessen the danger;
5. the permanence of the obstruction or use; and
6. the anticipated development in the foreseeable future of the area which may be affected by the obstruction or use.

See 76-5-406, MCA; ARM 36.15.216 (substantive provisions only).

Conditions or restrictions that generally apply to specific activities within the floodway or floodplain are:

1. the proposed activity, construction, or use cannot increase the upstream elevation of the 100-year flood a significant



amount (one-half foot or as otherwise determined by the permit issuing authority) or significantly increase flood velocities, ARM 36.15.604 (Applicable, substantive provisions only); and

2. the proposed activity, construction, or use must be designed and constructed to minimize potential erosion, see ARM 36.15.605.

For the substantive conditions and restrictions applicable to specific obstructions or uses, see the following applicable regulations:

Excavation of material from pits or pools- ARM 36.15.602 (1).

Water diversions or changes in place of diversion ARM 36.15.603.

Flood control works - ARM 36.15.606.

Roads, streets, highways and rail lines (must be designed to minimize increases in flood heights) - ARM 36.15.701(3) (c).

Structures and facilities for liquid or solid waste treatment and disposal (must be floodproofed to ensure that no pollutants enter flood waters and may be allowed and approved only in accordance with MDEQ regulations, which include certain additional prohibitions on such disposal) - ARM 36.15.701(3) (d).

Residential structures - ARM 36.15.702(1).

Commercial or industrial structures - ARM 36.15.702(2).

#### B. Solid Waste Management Regulations (Applicable)

Regulations promulgated under the Solid Waste Management Act, §§ 75-10-201 et seq. MCA, specify requirements that apply to the location of any solid waste management facility. Under ARM 17.50.505, a facility for the treatment, storage or disposal of solid wastes:

(a) must be located where a sufficient acreage of suitable land is available for solid waste management;

(b) may not be located in a 100-year floodplain;

(c) may be located only in areas which will prevent the pollution of ground and surface waters and public and private water supply systems;



(d) must be located to allow for reclamation and reuse of the land;

(e) drainage structures must be installed where necessary to prevent surface runoff from entering waste management areas; and

(f) where underlying geological formations contain rock fractures or fissures which may lead to pollution of the ground water or areas in which springs exist that are hydraulically connected to a proposed disposal facility, only Class III disposal facilities may be approved<sup>34</sup>.

Even Class III landfills may not be located on the banks of or in a live or intermittent stream or water saturated areas, such as marshes or deep gravel pits which contain exposed ground water. ARM 17.54.505(2)(j).

In addition, § 75-10-212 prohibits dumping or leaving any debris or refuse upon or within 200 yards of any highway, road, street, or alley of the State or other public property, or on privately owned property where hunting, fishing, or other recreation is permitted. However, the restriction relating to privately owned property does not apply to the owner, his agents, or those disposing of debris or refuse with the owner's consent.

#### C. Natural Streambed and Land Preservation Standards (Applicable)

Sections 87-5-502 and 504, MCA, (substantive provisions only) provide that a state agency or subdivision shall not construct, modify, operate, maintain or fail to maintain any construction project or hydraulic project which may or will obstruct, damage, diminish, destroy, change, modify, or the natural existing shape and form of any stream or its banks or tributaries in a manner that will adversely affect any fish or game habitat. The requirement that any such project must eliminate or diminish any adverse effect on fish or game habitat is applicable to the state in concurring upon any remedial actions to be conducted. The Natural Streambed and Land Preservation Act of 1975, MCA 75-7-101

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<sup>34</sup> Group III consist of primarily inert wastes, including industrial mineral wastes which are essentially inert and non-water soluble and do not contain hazardous waste constituents ARM 17 50 503(1)(b)



et seq. includes substantive requirements and is applicable to private parties as well as government agencies.

While the administrative/ procedural requirements including the consent and approval requirement set forth in these statutes and regulations are not ARARs, the party designing and implementing the remedial action for the CFR OU is encouraged to continue to consult with the Montana Department of Fish, Wildlife and Parks and any conservation district or board of county commissioners (or consolidated city/county government) as provided in the referenced statutes, to assist in the evaluation of factors discussed above.

ARM 36.2.410 establishes minimum standards which would be applicable if a remedial action alters or affects a streambed, including any channel change. Projects must be designed and constructed using methods that minimize adverse impacts to the stream (both upstream and downstream) and future disturbances to the stream. All disturbed areas must be managed during construction and reclaimed after construction to minimize erosion. Temporary structures used during construction must be designed to handle high flows reasonably anticipated during the construction period. Temporary structures must be completely removed from the stream channel at the conclusion of construction and the area must be restored to a natural or stable condition. Channel alternation must be designed to retain original stream length or otherwise provide hydrologic stability. Streambank vegetation must be protected except where removal of such vegetation is necessary for the completion of the project. When removal of vegetation is necessary, it must be kept to a minimum. Riprap, rock, and other material used in a project must be of adequate size, shape and density and must be properly placed to protect the streambank from erosion. The placement of road fill material in a stream, the placement of debris or other materials in a stream where it can erode or float into the stream, projects that permanently prevent fish migration, operation of construction equipment in a stream, and excavation of streambed gravels are prohibited unless specifically authorized by the district. Such projects must also protect the use of water for any useful or beneficial purpose. See 75-7-102, MCA.

## VI. MONTANA ACTION SPECIFIC REQUIREMENTS

### A. Water Quality Statute and Regulations (Applicable):

Causing of pollution: Section 75-5-605 of the Montana Water Quality Act prohibits the causing of pollution of any state



waters. Pollution is defined as contamination or other alteration of physical, chemical, or biological properties of state waters which exceeds that permitted by the water quality standards.

Placement of Wastes: Section 75-5-605, MCA states that it is unlawful to place or caused to be placed any wastes where they will cause pollution of any state waters. Placement of waste is not prohibited if the authorization for placement contains provisions for review of the placement of materials to ensure it will not cause pollution to state waters.

Nondegradation: Section 75-5-303, MCA states that existing uses of state waters and the level of water quality necessary to protect the uses must be maintained and protected. Section 75-5-317, MCA, provides an exemption from nondegradation requirements which allows changes of existing water quality resulting from an emergency or remedial activity that is designed to protect the public health or the environment and that is approved, authorized, or required by the department. Changes determined to meet these requirements may be considered nonsignificant. In determining that remedial actions are protective of public health and the environment and in approving, authorizing, or requiring such remedial activities, no significant degradation should be approved, considering the criteria for a determination of non-significance set out in 75-5-301(5)(c), which (i) equate significance with the potential for harm to human health, a beneficial use or the environment, (ii) consider both the quantity and strength of the pollutant, (iii) consider the length of time the degradation will occur, and (iv) consider the character of the pollutant so that greater significance is associated with carcinogens and toxins that bioaccumulate or biomagnify and lesser significance is associated with substances that are less harmful or less persistent. Under ARM 17.30.715(1)(b), concentrations of carcinogenic parameters or parameters with a bioconcentration factor greater than 300 cannot exceed the concentration in the receiving water in order for a discharge to be considered nonsignificant and thus exempt from nondegradation requirements under § 75-5-317.

ARM 17.30.705 provides that for any surface water, existing and anticipated uses and the water quality necessary to protect these uses must be maintained and protected unless degradation is allowed under the nondegradation rules at ARM 17.30.701 et seq.

ARM 17.30.1011 provides that any groundwater whose existing quality is higher than the standard for its classification must be maintained at that high quality unless degradation may be



allowed under the principles established in § 75-5-303, MCA, and the nondegradation rules at ARM 17.30.701 et seq.

B. Montana Pollutant Discharge Elimination System (MPDES) - stormwater and other point sources.

ARM 17.30.1342 - 1344 set forth the substantive requirements applicable to all MPDES permits. The substantive requirements, including the requirement to properly operate and maintain all facilities and systems of treatment and control are applicable requirements.

Under ARM 17.30.601 et seq., and ARM 17.30.1301 et seq., including ARM 17.30.1332, the Water Quality Division has issued general stormwater permits for certain activities. Generally, the permits require the permittee to implement Best Management Practices (BMP) and to take all reasonable steps to minimize or prevent any discharge which has a reasonable likelihood of adversely affecting human health or the environment.<sup>35</sup> However, if there is evidence indicating potential or realized impacts on water quality due to any storm water discharge associated with the activity, an individual Montana Pollutant Discharge Elimination System (MPDES) permit or alternative general permit may be required. The substantive requirements of the following permits are applicable for the following activities:

For construction activities: General Permit for Storm Water Discharge Associated with Construction Activity, Permit No. MTR 100000 (June 8, 2002);

For mining activities: General Discharge Permit for Storm Water Associated with Mining and with Oil and Gas Activities, Permit No. MTR300000 (November 17, 2002)<sup>36</sup>;

For industrial activities: General Permit for Storm Water Discharge Associated with Industrial Activity, Permit No. MTR000000 (October 1, 2001).

Generally, the permits require the permittee to implement Best Management Practices (BMP) and to take all reasonable steps to minimize or prevent any discharge which has a reasonable

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<sup>35</sup> For further explanation of storm water applications, see the letter from EPA to Chuck Stilwell, ARCO, dated February 2, 1999, which describes that treatment, in addition to BMPs, may be necessary if in-stream standards are not met after implementation of BMPs

<sup>36</sup> This permit covers point source discharges of storm water from mining and milling activities (including active, inactive, and abandoned mine and mill sites) including activities with Standard Industrial Code 14 (metal mining)



likelihood of adversely affecting human health or the environment. However, if there is evidence indicating potential or realized impacts on water quality due to any storm water discharge associated with the activity, an individual MPDES permit or alternative general permit may be required.

A related mine reclamation requirement is set out in ARM 17.24.633 (relevant and appropriate), which requires that all surface drainage from disturbed areas that have been graded, seeded or planted must be treated by the best technology currently available (BTCA) before discharge. Sediment control through BTCA practices must be maintained until the disturbed area has been reclaimed, the revegetation requirements have been met, and the area meets state and federal requirements for the receiving stream.

### C. Air Quality

#### Air Quality Regulations (Applicable)

Dust suppression and control of certain substances likely to be released into the air as a result of earth moving, transportation and similar actions related to remedial activity at the BPSOU may be necessary to meet air quality requirements. Certain ambient air standards for specific contaminants and particulates are set forth in the federal action specific section above. Additional air quality regulations under the state Clean Air Act, §§ 75-2-101 et seq., MCA, are discussed below.

ARM 17.8.604 (Applicable) lists certain wastes that may not be disposed of by open burning, including oil or petroleum products, RCRA hazardous wastes, chemicals, and treated lumber and timbers. Any waste which is moved from the premises where it was generated and any trade waste (material resulting from construction or operation of any business, trade, industry or demolition project) may be open burned only in accordance with the substantive requirements of 17.8.611 or 612.

ARM 17.8.308 (Applicable) provides that no person shall cause or authorize the production, handling, transportation or storage of any material; or cause or authorize the use of any street, road, or parking lot; or operate a construction site or demolition project, unless reasonable precautions to control emissions of airborne particulate matter are taken. Normally, emissions of airborne particulate matter must be controlled so that they do not "exhibit an opacity of twenty percent (20%) or greater averaged over six consecutive minutes." However, more stringent standards apply to non-attainment areas, including the



requirements to apply best available control technology (BACT) for new sources emitting less than 100 tons per year to particulate matter. ARM 17.8.308(4). Under the State Implementation Plan, the Air Quality Permitting Program applies a 5% opacity limit for haul roads. This more stringent limits would apply in Butte, which is a non-attainment area for particulate matter. See also ARM 17.8.304(2) (Applicable).

In addition, state law provides an ambient air quality standard for settled particulate matter. Particulate matter concentrations in the ambient air shall not exceed the following 30-day average: 10 grams per square meter. ARM 17.8.220 (Applicable). Whenever this standard is exceeded, the activity resulting in such exceedance shall be suspended until such time as conditions improve.

ARM 17.24.761 (Relevant and Appropriate) specifies a range of measures for controlling fugitive dust emissions during mining and reclamation activities. Some of these measures could be considered relevant and appropriate to control fugitive dust emissions in connection with excavation, earth moving and transportation activities conducted as part of the remedy at the site. Such measures include, for example, paving, watering, chemically stabilizing, or frequently compacting and scraping roads, promptly removing rock, soil or other dust-forming debris from roads, restricting vehicle speeds, revegetating, mulching, or otherwise stabilizing the surface of areas adjoining roads, restricting unauthorized vehicle travel, minimizing the area of disturbed land, and promptly revegetating regraded lands.

#### D. Solid Waste Management Regulations (Applicable)

As noted above, the Solid Waste Management Regulations are applicable to the disposal or active management of the tailings and similar wastes within the BPSOU. Certain of these regulations are identified in the state location specific ARARs above. Action specific solid waste regulations are discussed below:

ARM 17.50.505(2) specifies standards for solid waste management facilities, including the requirements that:



1. Class II<sup>37</sup> landfills must confine solid waste and leachate to the disposal facility. If there is the potential for leachate<sup>38</sup> migration, it must be demonstrated that leachate will only migrate to underlying formations which have no hydraulic continuity with any state waters;

2. adequate separation of group II wastes from underlying or adjacent water must be provided<sup>39</sup>; and

3. no new disposal units or lateral expansions may be located in wetlands.

ARM 17.50.506 specifies design requirements for landfills<sup>40</sup>. Landfills must either be designed to ensure that MCLs are not exceeded or the landfill must contain a composite liner and leachate collection system which comply with specified criteria.

ARM 17.50.511 sets forth general operational and maintenance and design requirements for solid waste management systems. Specific operational and maintenance requirements specified in ARM 17.50.511<sup>41</sup> that are relevant and appropriate are requirements for run-on and runoff control systems, requirements that sites be fenced to prevent unauthorized access, and prohibitions of point source and nonpoint source discharges which would violate Clean Water Act requirements.

ARM 17.50.523 specifies that solid waste must be transported in such a manner as to prevent its discharge, dumping, spilling or leaking from the transport vehicle.

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<sup>37</sup> Generally Class II landfills are licensed to receive Group II and Group III waste, but not regulated hazardous waste. Class III landfills may only receive Group III waste.

<sup>38</sup> Leachate is defined as a liquid which has contacted, passed through, or emerged from solid waste and contains soluble, suspended, or miscible materials removed from the waste. ARM 17.50.502(29).

<sup>39</sup> The extent of separation shall be established on a case-by-case basis, considering terrain and the type of underlying soil formations, and facility design. The Waste Management Section of DEQ has generally construed this to require a 10 to 20 foot separation from groundwater.

<sup>40</sup> Landfills are defined as an area of land or an excavation where wastes are placed for permanent disposal, and is not a land application unit, surface impoundment, injection well, or waste pile. ARM 17.50.502(27).

<sup>41</sup> ARM 17.50.511(1)(j), 17.50.511(1)(k) and 17.50.511(1)(l).



ARM 17.50.530 sets forth the closure<sup>42</sup> requirements for landfills. Class II landfills must meet the following criteria:

1. install a cover that is designed to minimize infiltration and erosion;
2. design and construct the final cover system to minimize infiltration through the closed unit by the use of an infiltration layer that contains a minimum 18 inches of earthen material and has a permeability less than or equal to the permeability of any bottom liner, barrier layer, or natural subsoils or a permeability no greater than  $1 \times 10^{-5}$  cm/sec, whichever is less;
3. minimize erosion of the final cover by the use of a seed bed layer that contains a minimum of six inches of earthen material that is capable of sustaining native plant growth and protecting the infiltration layer from frost effects and rooting damage; and
4. revegetate the final cover with native plant growth within one year of placement of the final cover.

ARM 17.50.530(1)(b) allows an alternative final cover design if the infiltration layer achieves reduction in infiltration at least equivalent to the stated criteria and the erosion layer provides protection equivalent to the stated criteria.

ARM 17.50.531 sets forth post closure care requirements for Class II landfills. Post closure care must be conducted for a period sufficient to protect human health and the environment. Post closure care requires maintenance of the integrity and effectiveness of any final cover, including making repairs to the cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and run-off from eroding or otherwise damaging the cover and comply with the groundwater monitoring requirements found at ARM Title 17, chapter 50, subchapter 7.

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<sup>42</sup> Closure means the process by which the operator closes all or part of the facility



Section 75-10-206, MCA, allows variances<sup>43</sup> to be granted from solid waste regulations if failure to comply with the rules does not result in a danger to public health or safety or compliance with specific rules would produce hardship without producing benefits to the health and safety of the public that outweigh the hardship. In certain circumstances relating to waste nature and volume and the provisions of the Superfund law regarding ongoing maintenance and review, certain of the Solid Waste regulations regarding design of landfills, operational and maintenance requirements, and landfill closure and post-closure care may appropriately be subject to variance for the BPSOU. For example, the barrier layer and leachate collection and removal system requirements of ARM 17.50.506 may be subject to variance as long as the design ensures that concentration values listed in Table 1, ARM 17.50.506, will not be exceeded in the uppermost aquifer, measured at the appropriate location. Similarly, the ground water monitoring requirements of ARM 17.50.701 et seq. can be considered and coordinated with any other monitoring requirements under CERCLA.

#### E. Reclamation Requirements

The Strip and Underground Mine Reclamation Act, §§ 82-4-201 through 254, MCA, technically applies to coal and uranium mining, but that statute and the regulations promulgated under that statute and discussed in this section set out the standards that mine reclamation should attain. Those requirements identified here have been determined to be relevant and appropriate requirements for this action. Section 82-4-231 (Relevant and Appropriate) requires the reclamation and revegetation of the land as rapidly, completely, and effectively as the most modern technology and the most advanced state of the art will allow. In developing a method of operation and plans of backfilling, water control, grading, topsoiling and reclamation, all measures shall be taken to eliminate damages to landowners and members of the public, their real and personal property, public roads, streams, and all other public property from soil erosion, subsidence, landslides, water pollution, and hazards dangerous to life and property. Sections 82-4-231(10)(j) and (10)(k)(i) and ARM 17.24.751 (Relevant and Appropriate) provide that reclamation of mine waste materials

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<sup>43</sup> See the letter from EPA to Chuck Stilwell, ARCO, dated May 21, 2002, which describes the application of variances to solid waste management rules for the Railroad Bed Time Critical Removal Action (TCRA) at the BPSOU



shall, to the extent possible using the best technology currently available, minimize disturbances and adverse impacts of the operation on fish, wildlife, and related environmental values and achieve enhancement of such resources where practicable, and shall avoid acid or other toxic mine drainage by such measures as preventing or removing water from contact with toxic producing deposits. ARM 17.24.641 (Relevant and Appropriate) also provides that drainage from acid forming or toxic-forming spoil into ground and surface water must be avoided by preventing water from coming into contact with such spoil. ARM 17.24.505 (Relevant and Appropriate) similarly provides that acid, acid forming, toxic, toxic-forming or other deleterious materials must not be buried or stored in proximity to a drainage course so as to cause or pose a threat of water pollution.

#### Reclamation Activities - Hydrology Regulations (Relevant and Appropriate)

The hydrology regulations promulgated under the Strip and Underground Mine Reclamation Act, §§ 82-4-201 et seq., MCA, provide detailed guidelines for addressing the hydrologic impacts of mine reclamation activities and earth-moving projects and are relevant and appropriate for addressing these impacts in the BPSOU.

ARM 17.24.631 (Relevant and Appropriate) provides that long-term adverse changes in the hydrologic balance from mining and reclamation activities, such as changes in water quality and quantity, and location of surface water drainage channels shall be minimized. Water pollution must be minimized and, where necessary, treatment methods utilized. Diversions of drainage to avoid contamination must be used in preference to the use of water treatment facilities. Other pollution minimization devices must be used if appropriate, including stabilizing disturbed areas through land shaping, diverting runoff, planting quickly germinating and growing stands of temporary vegetation, regulating channel velocity of water, lining drainage channels with rock or vegetation, mulching, and control of acid-forming, and toxic-forming waste materials.

ARM 17.24.633 (Relevant and Appropriate) provides water quality performance standards that may be invoked in the event that runoff from the treated areas threatens water quality or sediments in the stream, including the requirement that all surface drainage from a disturbed area must be treated by the best technology currently available (BTCA). Treatment must continue until the area is stabilized.



ARM 17.24.634 (Relevant and Appropriate) provides that, in reclamation of drainage, drainage design must emphasize channel and floodplain dimensions that approximate the pre-mining configuration and that will blend with the undisturbed drainage above and below the area to be reclaimed. The average stream gradient must be maintained with a concave longitudinal profile. This regulation provides specific requirements for designing the reclaimed drainage to:

1. approximate an appropriate geomorphic habit or characteristic pattern;
2. remain in dynamic equilibrium with the system without the use of artificial structural controls;
3. improve unstable premining conditions;
4. provide for floods and for the long-term stability of the landscape; and
5. establish a premining diversity of aquatic habitats and riparian vegetation.

ARM 17.24.635 through 26.4.637 (Relevant and Appropriate) set forth requirements for temporary and permanent diversions.

ARM 17.24.638 (Relevant and Appropriate) specifies sediment control measures to be implemented during operations.

ARM 17.24.639 (Relevant and Appropriate) sets forth requirements for temporary and permanent sedimentation ponds.

ARM 17.24.640 (Relevant and Appropriate) provides that discharge from sedimentation ponds, permanent and temporary impoundments, and diversions shall be controlled by energy dissipaters, riprap channels, and other devices, where necessary, to reduce erosion, prevent deepening or enlargement of stream channels, and to minimize disturbance of the hydrologic balance.

ARM 17.24.643 (Relevant and Appropriate) requires protection of groundwater resources.

ARM 17.24.645 (Relevant and Appropriate) sets forth requirements for groundwater monitoring.

ARM 17.24.646 (Relevant and Appropriate) sets forth requirements for surface water monitoring.



Reclamation and Revegetation Requirements (Relevant and Appropriate)

ARM 17.24.501 (Relevant and Appropriate) gives general backfilling and final grading requirements. Backfill must be placed so as to minimize sedimentation, erosion, and leaching of acid or toxic materials into waters, unless otherwise approved. Final grading must be to the approximate original contour of the land and final slopes must be graded to prevent slope failure, may not exceed the angle of repose, and must achieve a minimum long term static safety factor of 1:3. The

disturbed area must be blended with surrounding and undisturbed ground to provide a smooth transition in topography.

ARM 17.24.519 (Relevant and Appropriate) provides that an operator may be required to monitor settling of regraded areas.

ARM 17.24.702(4), (5), and (6) (Relevant and Appropriate) requires that during the redistributing and stockpiling of soil (for reclamation):

1. regraded areas must be deep-tilled, subsoiled, or otherwise treated to eliminate any possible slippage potential, to relieve compaction, and to promote root penetration and permeability of the underlying layer; this preparation must be done on the contour whenever possible and to a minimum depth of 12 inches;
2. redistribution must be done in a manner that achieves approximate uniform thicknesses consistent with soil resource availability and appropriate for the postmining vegetation., land uses, contours, and surface water drainage systems; and
3. redistributed soil must be reconditioned by subsoiling or other appropriate methods.

ARM 17.24.703 (Relevant and Appropriate) requires that when using materials other than, or along with, soil for final surfacing in reclamation, the operator must demonstrate that the material (1) is at least as capable as the soil of supporting the approved vegetation and subsequent land use, and (2) the medium must be the best available in the area to support vegetation. Such substitutes must be used in a manner consistent with the requirements for redistribution of soil in ARM 17.24.701 and 702.



ARM 17.24.711 (Relevant and Appropriate) requires that a diverse, effective, and permanent vegetative cover of the same seasonal variety native to the area of land to be affected shall be established except on road surfaces and below the low-water line of permanent impoundments. See also § 82-4-233, MCA (Relevant and Appropriate). Vegetative cover is considered of the same seasonal variety if it consists of a mixture of species of equal or superior utility when compared with the natural vegetation during each season of the year (See also ARM 17.24.716 and 719 below regarding substitution of introduced species for native-species). This requirement may not be appropriate where other cover is more suitable for the particular land use or another cover is requested by the landowner.

ARM 17.24.713 (Relevant and Appropriate) provides that seeding and planting of disturbed areas must be conducted during the first appropriate period for favorable planting after final seedbed preparation.

ARM 17.24.714 (Relevant and Appropriate) requires use of a mulch or cover crop or both until an adequate permanent cover can be established. Use of mulching and temporary cover may be suspended under certain conditions.

ARM 17.24.716 (Relevant and Appropriate) establishes the required method of revegetation, and provides that introduced species may be substituted for native species as part of an approved plan.

ARM 17.24.717 (Relevant and Appropriate) relates to the planting of trees and other woody species if necessary, as provided in § 82-4-233, MCA, to establish a diverse, effective, and permanent vegetative cover of the same seasonal variety native to the affected area and capable of self-regeneration and plant succession at least equal to the natural vegetation of the area, except that introduced species may be used in the revegetation process where desirable and necessary to achieve the approved land use plan.

ARM 17.24.718 (Relevant and Appropriate) requires the use of soil amendments and other means such as irrigation, management, fencing, or other measures, if necessary to establish a diverse and permanent vegetative cover.

ARM 17.24.721 (Relevant and Appropriate) specifies that rills or gullies in reclaimed areas must be filled, graded or otherwise stabilized and the area reseeded or replanted if the rills and gullies are disrupting the reestablishment of the vegetative



cover or causing or contributing to a violation of water quality standards for a receiving stream.

ARM 17.24.723 (Relevant and Appropriate) sets forth requirements for vegetation, soils, wildlife, and other monitoring.

ARM 17.24.724 (Relevant and Appropriate) specifies that revegetation success must be measured against approved unmined reference areas or by comparison with technical standards from historic data. More than one reference area or historic record must be established for vegetation types with significant variation due to a number of factors.

ARM 17.24.726 (Relevant and Appropriate) sets forth vegetation production, cover, diversity, density, and utility requirements.

ARM 17.24.728 (Relevant and Appropriate) sets forth performance standards for native species and introduced species in revegetated areas.

ARM 17.24.733 (Relevant and Appropriate) sets forth performance standards for composition and stocking of trees, shrubs, and half shrubs on the revegetated area and for measurement of revegetation success.

#### **TO BE CONSIDERED DOCUMENTS (TBCS)**

The use of documents identified as TBCs is addressed in the Introduction, above. A list of TBC documents is included in the Preamble to the NCP, 55 Fed. Reg. 8765 (March 8, 1990) . Those documents, plus any additional similar or related documents issued since that time, will be considered by EPA and DEQ during the conduct of the RI/FS, during remedy selection, and during remedy implementation.

#### **OTHER LAWS (NON-EXCLUSIVE LIST)**

CERCLA defines as ARARs only federal environmental and state environmental and siting laws. Remedial design, implementation, and operation and maintenance must nevertheless comply with all other applicable laws, both state and federal, if the remediation work is done by parties other than the federal government or its contractors.

The following "other laws" are included here to provide a reminder of other legally applicable requirements for actions



being conducted at this operable unit. They do not purport to be an exhaustive list of such legal requirements, but are included because they set out related concerns that must be addressed and, in some cases, may require some advance planning. They are not included as ARARs because they are not "environmental or facility siting laws." As applicable laws other than ARARs, they are not subject to ARAR waiver provisions.

Section 121(e) of CERCLA exempts removal or remedial actions conducted entirely on-site from federal, state, or local permits. This exemption is not limited to environmental or facility siting laws, but applies to other permit requirements as well.

#### Other Federal Laws

##### Occupational Safety and Health Regulations

The federal Occupational Safety and Health Act regulations found at 29 CFR § 1910 are applicable to worker protection during conduct of RI/FS or remedial activities.

#### Other Montana Laws

##### 1. Groundwater Act

Section 85-2-505, MCA, (Applicable) precludes the wasting of groundwater. Any well producing waters that contaminate other waters must be plugged or capped, and wells must be constructed and maintained so as to prevent waste, contamination, or pollution of groundwater.

Section 85-2-516, MCA, states that within 60 days after any well is completed a well log report must be filed by the driller with the DNRC and the appropriate county clerk and recorder.

##### 2. Public Water Supply Regulations

If remedial action at the site requires any reconstruction or modification of any public water supply line or sewer line, the construction standards specified in ARM 17.38.101 (Applicable) must be observed.

##### 3. Water Rights

Section 85-2-101, MCA, declares that all waters within the state are the state's property, and may be appropriated for beneficial uses. The wise use of water resources is encouraged for the



maximum benefit to the people and with minimum degradation of natural aquatic ecosystems.

Parts 3 and 4 of Title 85, Chapter 2, MCA, set out requirements for obtaining water rights and appropriating and utilizing water. All requirements of these parts are laws which must be complied with in any action using or affecting waters of the state. Some of the specific requirements are set forth below.

Section 85-2-301, MCA, of Montana law provides that a person may only appropriate water for a beneficial use.

Section 85-2-302, MCA, specifies that a person may not appropriate water or commence construction of diversion, impoundment, withdrawal or distribution works therefore except by applying for and receiving a permit from the Montana Department of Natural Resources and Conservation. While the permit itself may not be required under federal law, appropriate notification and submission of an application should be performed and a permit should be applied for in order to establish a priority date in the prior appropriation system.

Section 85-2-306, MCA, specifies the conditions on which groundwater may be appropriated, and, at a minimum, requires notice of completion and appropriation within 60 days of well completion.

Section 85-2-311, MCA, specifies the criteria which must be met in order to appropriate water and includes requirements that:

1. there are unappropriated waters in the source of supply;
2. the proposed use of water is a beneficial use; and
3. the proposed use will not interfere unreasonably with other planned uses or developments.

Section 85-2-402, MCA, specifies that an appropriator may not change an appropriated right except as provided in this section with the approval of the DNRC.

Section 85-2-412, MCA, provides that, where a person has diverted all of the water of a stream by virtue of prior appropriation and there is a surplus of water, over and above what is actually and necessarily used, such surplus must be returned to the stream.

#### 4. Controlled Ground Water Areas

Pursuant to § 85-2-507, MCA, the Montana Department of Natural Resources and Conservation may grant either a permanent or a



temporary controlled ground water area. The maximum allowable time for a temporary area is two years, with a possible two-year extension.

Pursuant to § 85-2-506, MCA, designation of a controlled ground water area may be proposed if: (i) excessive ground water withdrawals would cause contaminant migration; (ii) ground water withdrawals adversely affecting ground water quality within the ground water area are occurring or are likely to occur; or (iii) ground water quality within the ground water area is not suited for a specific beneficial use.

5. Occupational Health Act, §§ 50-70-101 et seq., MCA.

ARM § 17.74.101 addresses occupational noise. In accordance with this section, no worker shall be exposed to noise levels in excess of the levels specified in this regulation. This regulation is applicable only to limited categories of workers and for most workers the similar federal standard in 29 CFR 1910.95 applies.

ARM § 17.74.102 addresses occupational air contaminants. The purpose of this rule is to establish maximum threshold limit values for air contaminants under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects. In accordance with this rule, no worker shall be exposed to air contaminant levels in excess of the threshold limit values listed in the regulation. This regulation is applicable only to limited categories of workers and for most workers the similar federal standard in 29 CFR § 1910.1000 applies.

6. Montana Safety Act

Sections 50-71-201, 202 and 203, MCA, state that every employer must provide and maintain a safe place of employment, provide and require use of safety devices and safeguards, and ensure that operations and processes are reasonably adequate to render the place of employment safe. The employer must also do every other thing reasonably necessary to protect the life and safety of its employees. Employees are prohibited from refusing to use or interfering with the use of safety devices.

7. Employee and Community Hazardous Chemical  
Information

Sections 50-78-201, 202, and 204, MCA, state that each employer must post notice of employee rights, maintain at the work place a



list of chemical names of each chemical in the work place, and indicate the work area where the chemical is stored or used. Employees must be informed of the chemicals at the work place and trained in the proper handling of the chemicals.



B

Appendix  
B



## **ABBREVIATIONS**

### MEASUREMENT BASIS (BASIS)

DRY - Dry weight

WET - Wet weight (whole water or undried soil)

### FIELD OR DUPLICATE SAMPLE (STYPE)

FD - Environmental measurement (as opposed to data reported for QC)

DU - Field duplicate or replicate sample

### QA/QC LEVEL (QLEV)

0 - Data have not been validated and qualified

1 - Data reviewed and flagged by laboratory

2 - Data have been validated and qualified by PRP

3 - Data have been validated and qualified by EPA/State or data validation oversight completed by EPA/State

4 - Data have been validated but qualifiers not imported to system; or non-standard validation process.

### ANALYSIS QUALIFIERS

U - Undetected, value is estimated

J - Value is estimated

B - Detected but less than Contract Required Detection Limit

R - Rejected as unusable

### BSBLP - Butte-Silver Bow Lead Program

BS - Basement

DR - Driveway

EP - East Perimeter

EY - East Yard

GD - Garden

NP - North Perimeter

NY - North Yard

OT - Other

PA - Play Area

SP - South Perimeter

SY - South Yard

WP - West Perimeter

WY - West Yard

### ABLEV

A - Meets level A criteria

B - Meets level B criteria

U - Unknown



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic		Cadmium		Copper		Lead		Zinc		pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
															mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.									
1	BUTGW89A	GS-50	27-Jul-89	07/27/89-	WSO	1234488	744181	5476	8-78597	MHT997	FD			3	37		0 UJ		6 B		1 B		20 B			*15 ft N of alley, a			N	N	N	Y	
20	BUTSD89A	SD-107	13-Jun-89	01	DRY	1222000	743000	5422	8-93666	MHN561	FD	0	0.1	3	62		0 UJ		69		49 J		251					Y	Y	N	N		
21	BUTSD89A	SD-107	13-Jun-89	01	DRY	1222000	743000	5422	8-93666	MHN561	FD	0	0.1	3	63 U		10		249 U		258 U		302					Y	Y	N	Y		
22	BUTSD89A	SD-108	13-Jun-89	01	DRY	1222000	742900	5415	8-93688	MHN562	FD	0	0.1	3	323		1 U		561 B		693		1180					N	Y	N	Y		
23	BUTSD89A	SD-108	13-Jun-89	01	DRY	1222000	742900	5415	8-93688	MHN562	FD	0	0.1	3	283			6		533		678		1609				N	Y	N	N		
24	BUTSD89A	SD-109	13-Jun-89	01	DRY	1222500	743200	5419			FD	0	0.1	3	63 U		8		498		258 U		324					N	Y	N	Y		
25	BUTSD89A	SD-110	13-Jun-89	01	DRY	1223100	743000	5423			FD	0	0.1	3	270 U		9		760		702		1948					N	Y	N	Y		
26	BUTSD89A	SD-111	13-Jun-89	01	WSO	1223500	742800	5425	8-86794	MHS394	FD	0	0.1	3	10 J		360 J		150 B		0 UJ		39000					N	N	N	N		
27	BUTSD89A	SD-111	13-Jun-89	01	DRY	1223500	742800	5425	8-93682	MHN576	FD	0	0.1	3	156		35 J		1360 B		747 J		9830					N	Y	N	N		
28	BUTSD89A	SD-111	13-Jun-89	01	DRY	1223500	742800	5425	8-93682	MHN576	FD	0	0.1	3	270 U		56		5793		1196		15420					N	Y	N	Y		
29	BUTSD89A	SD-112	13-Jun-89	01	DRY	1222100	742900	5421	8-93680	MHN574	FD	0	0.1	3	89		8 J		1040 B		110 J		1490					N	Y	N	N		
30	BUTSD89A	SD-112	13-Jun-89	01	DRY	1222100	742900	5421	8-93680	MHN574	FD	0	0.1	3	270 U		10		1583		444 U		1668					N	Y	N	Y		
31	BUTSD89A	SD-112	13-Jun-89	07	DRY	1222100	742900	5421	8-94446	MHN580	FD	0	0.1	3	0		0		0		0		0					N	N	N	N		
32	BUTSD89A	SD-113	13-Jun-89	01	WSO	1223000	742200	5430	8-86796	MHS396	FD	0	0.2	3	34		0 UJ		7 B		0 UJ		20 B J					N	N	N	N		
33	BUTSD89A	SD-113	13-Jun-89	01	DRY	1223000	742200	5430	8-93658	MHN553	FD	0	0.2	3	54		0 B		127 B		80		275					N	Y	N	N		
34	BUTSD89A	SD-113	13-Jun-89	01	DRY	1223000	742200	5430	8-93658	MHN553	FD	0	0.2	3	63 U		6		249 U		258 U		327					N	Y	N	Y		
35	BUTSD89A	SD-114	13-Jun-89	01	DRY	1223300	741900	5435	8-93675	MHN569	DU	0	0.1	3	1590		17 J		2730 U		1110 J		4760					Y	Y	N	N		
36	BUTSD89A	SD-114	13-Jun-89	01	DRY	1223300	741900	5435	8-93671	MHN565	FD	0	0.1	3	1580		17 J		2660 U		906 J		4930					Y	Y	N	N		
37	BUTSD89A	SD-114	13-Jun-89	01	SRN	1223300	741900	5435	8-21657	MHS202	FD	0	0.1	3	251		134		25000 U		152		37000					N	N	N	N		
38	BUTSD89A	SD-114	13-Jun-89	01	DRY	1223300	741900	5435	8-93671	MHN565	FD	0	0.1	3	1318		25		2633		1563		1682					Y	Y	N	N		
39	BUTSD89A	SD-114	13-Jun-89	01 +	SND	1223300	741900	5435	8-93703	MHN303	FD	0	0.1	3	1650 J		33		4170 U		232 J		9730 J					N	N	N	N		
40	BUTSD89A	SD-114	13-Jun-89	01 -	FNE	1223300	741900	5435	8-93704	MHN304	FD	0	0.1	3	4640 J		20		5380 U		2990 J		6280 J					N	N	N	Y		
41	BUTSD89A	SD-115	14-Jun-89	01	DRY	1225300	741800	5433	8-93684	MHN578	FD	0	0.1	3	236		5 J		637 B		285 J		1970					Y	Y	N	N		
42	BUTSD89A	SD-115	14-Jun-89	01	DRY	1225300	741800	5433	8-93684	MHN578	FD	0	0.1	3	270 U		11		990		487		164					Y	Y	N	Y		
43	BUTSD89A	SD-116	14-Jun-89	01	DRY	1225400	741800	5436	8-93628	MHN525	FD	0	0	3	4220		44		21400 B		991		11500					Y	Y	N	N		
44	BUTSD89A	SD-116	14-Jun-89	01	DRY	1225400	741800	5436	8-93628	MHN525	FD	0	0	3	2900		42		28120		1966		16920					Y	Y	N	Y		
45	BUTSD89A	SD-117	14-Jun-89	01	WSO	1225900	741900	5439	8-86795	MHS395	FD	0	0.1	3	9 J		0 UJ		6 U		0 UJ		86					N	N	N	N		
46	BUTSD89A	SD-117	14-Jun-89	01	DRY	1225900	741900	5439	8-93626	MHN524	FD	0	0.1	3	827		10		293 B		1990		3560					N	Y	N	Y		
47	BUTSD89A	SD-117	14-Jun-89	01	DRY	1225900	741900	5439	8-93626	MHN524	FD	0	0.1	3	394		11		118 U		997		4783					N	Y	N	N		
48	BUTSD89A	SD-118	14-Jun-89	01	DRY	1226100	742700	5439			FD	0	0.1	3	270 U		14		601		1679		2257					N	Y	N	Y		
49	BUTSD89A	SD-119	14-Jun-89	01	DRY	1226800	742700	5434	8-87456	MHN598	FD	0	0.8	3	324		0 U		254 B		193		620					N	Y	N	N		
50	BUTSD89A	SD-119	14-Jun-89	01	DRY	1226800	742700	5434	8-87456	MHN598	FD	0	0.8	3	270 U		8		118 U		444 U		1043					N	Y	N	Y		
51	BUTSD89A	SD-120	15-Jun-89	01	DRY	1227100	743000	5449	8-87477	MHT919	FD	0	0.1	3	93		4		1090		397		1070					N	Y	N	N		
52	BUTSD89A	SD-120	15-Jun-89	01	DRY	1227100	743000	5449	8-87477	MHT919	FD	0	0.1	3	270 U		2		118 U		444 U		1035					N	Y	N	Y		
53	BUTSD89A	SD-121	15-Jun-89	01	WSO	1228400	742200	5439	8-86793	MHS393	FD	0	0.1	3	7		220 J		3300 B		0 UJ		92000					N	N	N	N		
54	BUTSD89A	SD-121	15-Jun-89	01	DRY	1228400	742200	5439	8-93655	MHN550	FD																						



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic		Cadmium		Copper		Lead		Zinc		pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
															mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual									
94	BUTSD89A	SD-136	20-Jun-89	01	DRY	1228700	741800	5439	8-93697	MHN590	FD	0	0.1	3	356		11		1494		561		1454				N	Y	N	Y			
95	BUTSD89A	SD-137	20-Jun-89	01	DRY	1232100	743200	5453			FD	0	0.2	3	270 U		22		3680		468		4219				Y	Y	N	Y			
96	BUTSD89A	SD-138	20-Jun-89	01	DRY	1229900	741100	5442	8-86665	MHT955	FD	0	0.7	3	88		2		255 B		139		617				Y	Y	N	N			
97	BUTSD89A	SD-138	20-Jun-89	01	DRY	1229900	741100	5442	8-86665	MHT955	FD	0	0.7	3	63 U		8		353		392		705				Y	Y	N	Y			
98	BUTSD89A	SD-139	20-Jun-89	01	DRY	1228600	742000	5442	8-86661	MHT951	FD	0	0.8	3	226		15		2540 B		614		3670				Y	Y	N	N			
99	BUTSD89A	SD-139	20-Jun-89	01	DRY	1228600	742000	5442	8-86661	MHT951	FD	0	0.8	3	282		27		5074		882		4652				Y	Y	N	Y			
100	BUTSD89A	SD-140	21-Jun-89	01	DRY	1232900	744900	5478	8-86680	MHT970	DU	0	0.2	3	279		0 UJ		700 B		439		320				Y	Y	N	N			
101	BUTSD89A	SD-140	21-Jun-89	01	WSO	1232900	744900	5478	8-86797	MHS397	FD	0	0.2	3	3900		89 J		27000		2		25000				N	N	N	N			
102	BUTSD89A	SD-140	21-Jun-89	01	DRY	1232900	744900	5478	8-86678	MHT968	FD	0	0.2	3	264		0 UJ		629 B		434		317				Y	Y	N	N			
103	BUTSD89A	SD-140	21-Jun-89	01	DRY	1232900	744900	5478	8-86678	MHT968	FD	0	0.2	3	270 U		4		345		444 U		407				Y	Y	N	Y			
104	BUTSD89A	SD-140	21-Jun-89	01	WSO	1232900	744900	5478	8-86799	MHS399	FD			3	3500		80 J		25000		12		24000				N	N	N	N			
105	BUTSD89A	SD-141	21-Jun-89	01	DRY	1233000	744900	5473	8-87454	MHN596	FD	0	0.1	3	8		0 U		41 B		18		93				Y	Y	N	N			
106	BUTSD89A	SD-141	21-Jun-89	01	DRY	1233000	744900	5473	8-87454	MHN596	FD	0	0.1	3	83 U		2 U		249 U		258 U		240 U				Y	Y	N	Y			
107	BUTSD89A	SD-142	21-Jun-89	01	DRY	1234500	744800	5487	8-86654	MHT945	FD	0	0.2	3	213		0 U		1100 B		157		844				Y	Y	N	N			
108	BUTSD89A	SD-142	21-Jun-89	01	DRY	1234500	744800	5487	8-86654	MHT945	FD	0	0.2	3	270 U		6		1134		444 U		651				Y	Y	N	Y			
109	BUTSD89A	SD-143	21-Jun-89	01	DRY	1233700	745300	5492			FD	0	0.1	3	270 U		9		548		444 U		497				Y	Y	N	Y			
110	BUTSD89A	SD-144	21-Jun-89	01	DRY	1233600	744300	5467	8-86667	MHT957	FD	0	0.3	3	47		2		260 B		169		466				Y	Y	N	N			
111	BUTSD89A	SD-144	21-Jun-89	01	DRY	1233600	744300	5467	8-86667	MHT957	FD	0	0.3	3	63 U		10		429		256 U		475				Y	Y	N	Y			
112	BUTSD89A	SD-145	22-Jun-89	01	WSO	1227800	742100	5441	8-86770	MHS370	FD	0	0.1	3	130 J		0 B		91 B		1 B J		21				N	N	N	N			
113	BUTSD89A	SD-145	22-Jun-89	01	DRY	1227800	742100	5441	8-93637	MHN534	FD	0	0.1	3	144		8		783 B		810		1510				N	Y	N	Y			
114	BUTSD89A	SD-145	22-Jun-89	01	DRY	1227800	742100	5441	8-93637	MHN534	FD	0	0.1	3	270 U		9		628		684		1816				N	Y	N	N			
115	BUTSD89A	SD-146	22-Jun-89	01	DRY	1234900	744900	5490	8-86664	MHT954	DU	0	0.2	3	164		2		562 B		224		794				Y	Y	N	N			
116	BUTSD89A	SD-146	22-Jun-89	01	DRY	1234900	744900	5490	8-86663	MHT953	FD	0	0.2	3	192		2		595 B		177		628				Y	Y	N	N			
117	BUTSD89A	SD-146	22-Jun-89	01	SRN	1234900	744900	5490	8-21660	MHS205	FD	0	0.2	3	42		82		6650 B		76		13000				N	N	N	N			
118	BUTSD89A	SD-146	22-Jun-89	01	DRY	1234900	744900	5490	8-86663	MHT953	FD	0	0.2	3	270 U		8		822		444 U		730				Y	Y	N	Y			
119	BUTSD89A	SD-146	22-Jun-89	01 +	SND	1234900	744900	5490	8-93713	MHN313	FD	0	0.2	3	256 J		1 B		902 B		291 J		1060 J				N	N	N	N			
120	BUTSD89A	SD-146	22-Jun-89	01 -	FNE	1234900	744900	5490	8-93714	MHN314	FD	0	0.2	3	413 J		1		1470 B		411 J		1390 J				N	N	N	N			
121	BUTSD89A	SD-147	22-Jun-89	01	WSO	1235600	745000	5525	8-86768	MHS368	FD	0	0.1	3	15		370		730 B		0 UJ		86000				N	N	N	N			
122	BUTSD89A	SD-147	22-Jun-89	01	DRY	1235600	745000	5525	8-93644	MHN540	FD	0	0.1	3	119		13		1000 B		206		3400				Y	Y	N	N			
123	BUTSD89A	SD-147	22-Jun-89	01	DRY	1235600	745000	5525	8-93644	MHN540	FD	0	0.1	3	270 U		26		2668		444 U		3139				Y	Y	N	Y			
124	BUTSD89A	SD-148	22-Jun-89	01	DRY	1231800	743100	5452	8-87458	MHT901	FD	0	0.1	3	267		29		1300 B		793		11300				Y	Y	N	N			
125	BUTSD89A	SD-148	22-Jun-89	01	DRY	1231800	743100	5452	8-87458	MHT901	FD	0	0.1	3	270 U		59		5319		954		1302				Y	Y	N	Y			
126	BUTSD89A	SD-149	22-Jun-89	01	DRY	1226800	742500	5455	8-87473	MHT915	FD	0	0.1	3	285		0 U		800		28		133				N	Y	N	N			
127	BUTSD89A	SD-149	22-Jun-89	01	DRY	1226800	742500	5455	8-87473	MHT915	FD	0	0.1	3	288		4		654		444 U		171				N	Y	N	Y			
128	BUTSD89A	SD-150	22-Jun-89	01	DRY	1226400	742000	5443	8-87461	MHT904	FD	0	0.1	3	695		19		660		3300		5460				N	Y	N	Y			
129	BUTSD89A	SD-150	22-Jun-89	01	DRY	1226400	742000	5443	8-87461	MHT904	FD	0	0.1	3	286		12		118 U		1107		6483				N	Y	N	N			
130	BUTSD89A	SD-151	22-Jun-89	01	WSO	1226700	742600	545																									



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic		Cadmium		Copper		Lead		Zinc		pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
															mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.									
169	BUTSD89A	SD-184	04-Aug-89	01	WSD	1226600	743100	5444	8-86781	MHS381	FD	0	0.1	3	8900		1800	J	900000		0	UJ	680000				N	N	N	N			
170	BUTSD89A	SD-184	04-Aug-89	01	DRY	1226600	743100	5444	8-86658	MHT949	FD	0	0.1	3	996		20		8590	B	725		6270				N	Y	N	N			
171	BUTSD89A	SD-184	04-Aug-89	01	SRN	1226600	743100	5444	8-21665	MHS210	FD	0	0.1	3	9600		971		873000		823		434000				N	N	N	N			
172	BUTSD89A	SD-184	04-Aug-89	01	DRY	1226600	743100	5444	8-86658	MHT949	FD	0	0.1	3	692		25		7551		1118		4939				N	Y	N	Y			
173	BUTSD89A	SD-184	04-Aug-89	01 *	SND	1226600	743100	5444	8-93724	MHN324	FD	0	0.1	3	161		0	U	197	U	230		101				N	N	N	N			
174	BUTSD89A	SD-184	04-Aug-89	01 -	FNE	1226600	743100	5444	8-93725	MHN325	FD	0	0.1	3	938		1		1480	U	1050		746				N	N	N	N			
175	BUTSD89A	SD-185	04-Aug-89	01	DRY	1227100	742300	5455	8-86666	MHT956	FD	0	0.1	3	346		0	U	5650	B	127		394				N	Y	N	N			
176	BUTSD89A	SD-185	04-Aug-89	01	DRY	1227100	742300	5455	8-86666	MHT956	FD	0	0.1	3	270	U	5		4204		444	U	286				N	Y	N	Y			
177	BUTSD89A	SD-186	04-Aug-89	01	SRN	1225600	742200	5464	8-21667	MHS212	DU	0	0.3	3	51		1990		1380000		80		980000				N	N	N	N			
178	BUTSD89A	SD-186	04-Aug-89	01	DRY	1225600	742200	5464	8-94444		DU	0	0.3	3	5	BJ	931	J	0		58	BJ	0				N	N	N	N			
179	BUTSD89A	SD-186	04-Aug-89	01	WSD	1225600	742200	5464	8-86780	MHS380	FD	0	0.3	3	20		2090	J	42000		7		670000				N	N	N	N			
180	BUTSD89A	SD-186	04-Aug-89	01	DRY	1225600	742200	5464	8-86692	MHT980	FD	0	0.3	3	548		63	J	11900	B	1210		22800				N	Y	N	N			
181	BUTSD89A	SD-186	04-Aug-89	01	SRN	1225600	742200	5464	8-21666	MHS211	FD	0	0.3	3	66		2900		1300000		142		1030000				N	N	N	N			
182	BUTSD89A	SD-186	04-Aug-89	01	DRY	1225600	742200	5464	8-94443	MHT980	FD	0	0.3	3	7	BJ	917	J	0		447	J	0				N	N	N	N			
183	BUTSD89A	SD-186	04-Aug-89	01	DRY	1225600	742200	5464	8-86692	MHT980	FD	0	0.3	3	406		45		11940		1110		13220				N	Y	N	N			
184	BUTSD89A	SD-186	04-Aug-89	01	DRY	1225600	742200	5464	8-86695	MHT983	FD	0	0.3	3	657		40	J	12400	B	937		12700				N	Y	N	N			
185	BUTSD89A	SD-186	04-Aug-89	01 *	SND	1225600	742200	5464	8-93726	MHN326	FD	0	0.3	3	1040		8		6980		461		3110				N	N	N	N			
186	BUTSD89A	SD-186	04-Aug-89	01 -	FNE	1225600	742200	5464	8-87544	MHN327	FD	0	0.3	3	1680		8		10300	B	4850		2950				N	N	N	Y			
187	BUTSD89A	SD-500	19-Jun-89	01	DRY	1226144	742746	5439			FD	0	0.1	3	275		18		1195		444	U	1006				N	Y	N	Y			
188	BUTSD89A	SD-501	06-Jul-89	01	DRY	1225611	742855	5447	8-94389	MHT839	FD	0	0.1	3	3530		1	U	312		278		728				N	Y	N	N			
189	BUTSD89A	SD-501	06-Jul-89	01	DRY	1225611	742855	5447	8-94389	MHT839	FD	0	0.1	3	1999		8		118	U	613		1079				N	Y	N	Y			
190	BUTSD89A	SD-502	23-Jun-89	01	DRY	1225510	743039	5448			FD	0	0.1	3	270	U	23		1447		1364		5033				Y	Y	N	Y			
191	BUTSD89A	SD-503	06-Jul-89	01	DRY	1225201	742790	5439	8-94393	MHT844	FD	0	0.1	3	151		8	J	653	J	3370	J	6960	J			N	Y	N	Y			
192	BUTSD89A	SD-503	06-Jul-89	01	DRY	1225201	742790	5439	8-94393	MHT844	FD	0	0.1	3	270	U	37		1482		2756		6424				N	Y	N	N			
193	BUTSD89A	SD-504	06-Jul-89	01	DRY	1225396	742597	5439	8-94395	MHT845	FD	0	0.1	3	249		8	J	969	J	1660	J	4570	J			N	Y	N	Y			
194	BUTSD89A	SD-504	06-Jul-89	01	DRY	1225396	742597	5439	8-94395	MHT845	FD	0	0.1	3	270	U	17		838		945		5236				N	Y	N	N			
195	BUTSD89A	SD-505	06-Jul-89	01	WSD	1225460	741956	5431	8-86751	MHS351	FD	0	0.1	3	4	J	470	J	370000	J	0	UJ	150000				N	N	N	N			
196	BUTSD89A	SD-505	06-Jul-89	01	DRY	1225460	741956	5431	8-94400	MHT850	FD	0	0.1	3	97		4	J	3980	J	256	J	1980	J			N	Y	N	N			
197	BUTSD89A	SD-505	06-Jul-89	01	SRN	1225460	741956	5431	8-21669	MHS214	FD	0	0.1	3	24		1270		950000		97		441000				N	N	N	N			
198	BUTSD89A	SD-505	06-Jul-89	01	DRY	1225460	741956	5431	8-78113	MHT850	FD	0	0.1	3	3	BJ	300	J	0		25	UJ	0				N	N	N	N			
199	BUTSD89A	SD-505	06-Jul-89	01	DRY	1225460	741956	5431	8-94400	MHT850	FD	0	0.1	3	270	U	13		4809		444	U	2017				N	Y	N	N			
200	BUTSD89A	SD-505	06-Jul-89	01	WSD	1225460	741956	5431	8-86752	MHS352	FD			3	5	J	520	J	300000	J	0	UJ	160000				N	N	N	N			
201	BUTSD89A	SD-505	06-Jul-89	01 *	SND	1225460	741956	5431	8-86748	MHT748	FD	0	0.1	3	106		2		1970		291		1200				N	N	N	N			
202	BUTSD89A	SD-505	06-Jul-89	01 -	FNE	1225460	741956	5431	8-86749	MHT749	FD	0	0.1	3	283		4		7250		983		2780				N	N	N	N			
203	BUTSD89A	SD-506	20-Jun-89	01	DRY	1225067	742455	5435			FD	0	0.1	3	270	U	61		3960		1286		11460				N	Y	N	Y			
204	BUTSD89A	SD-507	20-Jun-89	01	DRY	1225300	742303	5435	8-94258	MHT858	FD	0	0.1	3	1260		9	J	3480	J	4120	J											



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic mg/kg	Cadmium mg/kg	Copper mg/kg	Lead mg/kg	Zinc mg/kg	pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
244	BUTSD89A	SD-518	06-Jul-89	04	WSO	1222439	743071	5420	8-86760	MHS360	FD	0	0.1	3	5	330	82 J	0 UJ	25000				N	N	N	N		
245	BUTSD89A	SD-519	23-Jun-89	01	DRY	1222091	742614	5427	8-93607	MHN507	FD	0	0.1	3	466	5	805	485	2180				Y	Y	Y	N	N	
246	BUTSD89A	SD-519	23-Jun-89	01	DRY	1222091	742614	5427	8-93607	MHN507	FD	0	0.1	3	459	12	1236	588	1589				Y	Y	Y	N	Y	
247	BUTSD89A	SD-520	23-Jun-89	01	DRY	1222263	743226	5423	8-93608	MHN508	FD	0	0.1	3	124	1	96	63	318				Y	Y	Y	N	N	
248	BUTSD89A	SD-520	23-Jun-89	01	DRY	1222263	743226	5423	8-93608	MHN508	FD	0	0.1	3	63 U	8	249 U	258 U	357				Y	Y	Y	N	Y	
249	BUTSD89A	SD-521	06-Jul-89	01	DRY	1223746	742021	5425	8-93730	MHT730	FD	0	0.1	3	265	8 J	484 J	246 J	2290				N	Y	Y	N	N	
250	BUTSD89A	SD-521	06-Jul-89	01	SRN	1223746	742021	5425	8-21887	MHS232	FD	0	0.1	3	1100 J	320 J	64000 J	130 J	110000				N	N	N	N	N	
251	BUTSD89A	SD-521	06-Jul-89	01	DRY	1223746	742021	5425	8-93730	MHT730	FD	0	0.1	3	309	9	1073	444 U	891				N	Y	Y	N	N	
252	BUTSD89A	SD-521	06-Jul-89	01 +	SND	1223746	742021	5425	8-78384	MHN284	FD	0	0.1	3	309	17	277	242 J	5260 J				N	N	N	N	N	
253	BUTSD89A	SD-521	06-Jul-89	01 -	FNE	1223746	742021	5425	8-78385	MHN285	FD	0	0.1	3	1220	19	1090	1190 J	6040 J				N	N	N	N	Y	
254	BUTSD89A	SD-522	06-Jul-89	01	DRY	1223509	742396	5424	8-93731	MHT731	FD	0	0.1	3	579	3 J	1570 J	676 J	1730				N	Y	Y	N	N	
255	BUTSD89A	SD-522	06-Jul-89	01	DRY	1223509	742396	5424	8-93731	MHT731	FD	0	0.1	3	904	7	1938	886	1672				N	Y	Y	N	Y	
256	BUTSD89A	SD-523	06-Jul-89	01	DRY	1223265	742724	5426	8-93732	MHT732	FD	0	0.1	3	1320	29 J	2990 J	2240 J	10200				N	Y	Y	N	N	
257	BUTSD89A	SD-523	06-Jul-89	01	DRY	1223265	742724	5426	8-93732	MHT732	FD	0	0.1	3	1703	45	5437	2552	13300				N	Y	Y	N	Y	
258	BUTSD89A	SD-524	06-Jul-89	01	DRY	1222823	742638	5420	8-93733	MHT733	FD	0	0.1	3	771	5 J	417 J	394 J	1580				N	Y	Y	N	N	
259	BUTSD89A	SD-524	06-Jul-89	01	SRN	1222823	742638	5420	8-21688	MHS233	FD	0	0.1	3	500 J	44 J	2500 J	79 J	30000				N	N	N	N	N	
260	BUTSD89A	SD-524	06-Jul-89	01	DRY	1222823	742638	5420	8-93733	MHT733	FD	0	0.1	3	1166	4	694	751	961				N	Y	Y	N	N	
261	BUTSD89A	SD-524	06-Jul-89	01 +	SND	1222823	742638	5420	8-78386	MHN286	FD	0	0.1	3	798	10	387	284 J	3150 J				N	N	N	N	N	
262	BUTSD89A	SD-524	06-Jul-89	01 -	FNE	1222823	742638	5420	8-78387	MHN287	FD	0	0.1	3	2010	32	2570	1570 J	8920 J				N	N	N	N	Y	
263	BUTSD89A	SD-525	06-Jul-89	01	DRY	1222465	742637	5423	8-93734	MHT734	FD	0	0.1	3	827	1 J	443 J	712 J	842				N	Y	Y	N	Y	
264	BUTSD89A	SD-525	06-Jul-89	01	DRY	1222465	742637	5423	8-93734	MHT734	FD	0	0.1	3	866	6	531	711	944				N	Y	Y	N	N	
265	BUTSD89A	SD-526	06-Jul-89	01	DRY	1222683	742905	5421	8-93735	MHT735	FD	0	0.1	3	870	7 J	1910 J	708 J	2820				N	Y	Y	N	N	
266	BUTSD89A	SD-526	06-Jul-89	01	DRY	1222683	742905	5421	8-93735	MHT735	FD	0	0.1	3	1163	18	2334	1116	2773				N	Y	Y	N	Y	
267	BUTSD89A	SD-526	06-Jul-89	01	DRY	1222683	742905	5421	8-93736	MHT736	FD	0	0.1	3	893	8 J	1940 J	746 J	2870				N	Y	Y	N	N	
268	BUTSD89A	SD-601	28-Jun-89	01	DRY	1236121	745213	5523			FD	0	0.1	3	83 U	9	683	258 U	431				Y	Y	Y	N	Y	
269	BUTSD89A	SD-602	29-Jun-89	01	DRY	1235009	745419	5495			FD	0	0.1	3	270 U	6	1789	444 U	1048				Y	Y	Y	N	Y	
270	BUTSD89A	SD-603	28-Jun-89	01	DRY	1235306	744815	5486			FD	0	0.1	3	63 U	2 U	515	258 U	433				Y	Y	Y	N	Y	
271	BUTSD89A	SD-604	06-Jul-89	01	DRY	1235454	744586	5481			FD	0	0.1	3	83 U	10	811	258 U	387				Y	Y	Y	N	Y	
272	BUTSD89A	SD-605	29-Jun-89	01	DRY	1234407	745589	5494			FD	0	0.1	3	63 U	7	646	258 U	330				Y	Y	Y	N	Y	
273	BUTSD89A	SD-606	29-Jun-89	01	DRY	1234555	745254	5494			FD	0	0.1	3	63 U	5	728	258 U	384				Y	Y	Y	N	Y	
274	BUTSD89A	SD-607	28-Jun-89	01	DRY	1234706	744749	5484			FD	0	0.1	3	63 U	7	356	258 U	240 U				Y	Y	Y	N	Y	
275	BUTSD89A	SD-609	28-Jun-89	01	DRY	1234856	744280	5479			FD	0	0.1	3	83 U	11	348	258 U	385				Y	Y	Y	N	Y	
276	BUTSD89A	SD-610	27-Jun-89	01	DRY	1233639	745164	5491			FD	0	0.1	3	63 U	2 U	249 U	258 U	240 U				Y	Y	Y	N	Y	
277	BUTSD89A	SD-611	26-Jun-89	03	DRY	1233905	744842	5489	8-93609	MHN509	FD			3	79	0 U	315	85	36				N	N	N	N	N	
278	BUTSD89A	SD-611	26-Jun-89	18	DRY	1233905	744842	5489	8-93612	MHN512	FD			3	165	2	241	532	801				N	N	N	N	Y	
279	BUTSD89A	SD-611	26-Jun-89	18		1233905	744842	5489	8-78391	MHN291	FD			3	9 B	2 B	212	4	170				N	N	N	N	N	
280	BUTSD89A	SD-612	27-Jun-89	13	DRY	1234115	744496	5489	8-93610	MHN510	FD			3	617 J	0 UJ	1130 J	102	1190				N	N	N	N	Y	
281	BUTSD89A	SD-613	29-Jun-89	01	DRY	1234371	744366	5488			FD	0	0.1	3	63 U	4	249 U	258 U	262			IN PAVED AREA NEAR O	Y	Y	Y	N	Y	
282	BUTSD89A	SD-614	28-Jun-89	01	DRY	1234490	744162	5475			FD	0	0.1	3	63 U	2 U	440	258 U	279				Y	Y	Y	N	Y	
283	BUTSD89A	SD-614	28-Jun-89	10	DRY	1234490	744162	5475	8-93611	MHN511	FD			3	20	1 B	213	43	174				N	N	N	N	N	
284	BUTSD89A	SD-615	27-Jun-89	01	DRY	1234218	744222	5476			FD	0	0.1	3	63 U	6	266	258 U	448				Y	Y	Y	N	Y	
285	BUTSD89A	SD-616	27-Jun-89	01	DRY	1233802	744666	5488			FD	0	0.1	3	63 U	5	293	258 U	240 U				Y	Y	Y	N	Y	
286	BUTSD89A	SD-617	28-Jun-89	01	DRY	1233896	744167	5468			FD	0	0.1	3	63 U	6	249 U	258 U	240 U				Y	Y	Y	N	Y	
287	BUTSD89A	SD-618	26-Jun-89	01	DRY	1233396	744738	5471			FD	0	0.1	3	63 U	7	309	306	373			IN PAVED AREA NEAR O	Y	Y	Y	N	Y	
288	BUTSD89A	SD-619	27-Jun-89	01	DRY	1233541	744476	5470	8-94382	MHT832	DU	0	0.1	3	8	1 U	54	20	86				Y	Y	Y	N	N	
289	BUTSD89A	SD-619	27-Jun-89	01	DRY	1233541	744476	5470	8-94381	MHT831	FD	0	0.1	3	8	1 U	50	23	212				Y	Y	Y	N	N	
290	BUTSD89A	SD-619	27-Jun-89	01	DRY	1233541	744476	5470	8-94381	MHT831	FD	0	0.1	3	63 U	3	249 U	258 U	240 U				Y	Y	Y	N	Y	
291	BUTSD89A	SD-620	26-Jun-89	01	DRY	1233489	744223	5466			FD	0	0.1	3	270 U	7	679	444 U	1073				Y	Y	Y	N	Y	
292	BUTSD89A	SD-622	06-Jul-89	01	DRY	1233164	744103	5465	8-94385	MHT835	FD	0	0.1	3	138	3	754	649	1390				Y	Y	Y	N	Y	
293	BUTSD89A	SD-622	06-Jul-89	01	DRY	1233164	744103	5465	8-94385	MHT835	FD	0	0.1	3	270 U	5	857	641	1752				Y	Y	Y	N	N	
295	BUTSO87A	BF-003	23-Jun-87	A	DRY	1225810	753549	6055	MHH 213	MHH 213	FD	0	0.08	3	36 J	7	268	647	1340	5.85	"RR GRADE EXCELSIOR,		Y	Y	Y	N	Y	
296	BUTSO87A	BF-004	23-Jun-87	A	DRY	1222754	747846	5687	MHH 210	MHH 210	FD	0	0.08	3	2 J	13	1100	518	1230	2.85	"BAP RAILROAD, Map 1	"DUPE ENTRY, SAME CO	Y	Y	Y	N	Y	
297	BUTSO87A	BF-005	23-Jun-87	A	DRY	1226908	748828	5734	MHH 205	MHH 205	FD	0	0.08	3	33 J	18	143	2600	3000	7.2	"524 W. Granite Bul		Y	Y	Y	N	Y	
298	BUTSO87A	BF-006	23-Jun-87	A	DRY	1228242	751435	5958	MHH 207	MHH 207	FD	0	0.08	3	283 J	18	1200	1330	3500	6.66	"RR GRADE NEAR RUBY,	"SAME LOCATION AND C	N	Y	Y	N	Y	
299	BUTSO87A	BF-007	24-Jun-87	A	DRY	1225776	751201	5877	MHH 250	MHH 250	FD	0	0.08	3	91	14	623	1720 J	2340 J	4.59	"826 Empire, Butte,		Y	Y	Y	N	Y	
300	BUTSO87A	BF-008	25-Jun-87	A	DRY	1225124	749637	5776	MHH 279	MHH 279	FD	0	0.08	3	414	16	3170 J	909	4470 J	4.12	"COPR/HENRY RR GRADE	"SAME LOCATION AND C	Y					



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic		Cadmium		Copper		Lead		Zinc		pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
															mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.									
327	BUTSO87A	MS-011	29-Jun-87	A	DRY	1227964	755297	6285	MHH 324	MHH 324	FD	0	0.08	3	75		29		303		3300		8960		4.78	"MOULTON MILL, Map Q		N	Y	N	Y		
331	BUTSO87A	MS-015	30-Jun-87	A	DRY	1228294	749610	5616	MHH 347	MHH 347	FD	0	0.08	3	51		6 J		1550		520		1240		4.45	"COLORADO STAMP MILL		N	Y	N	Y		
332	BUTSO87A	MS-016	30-Jun-87	A	DRY	1228295	749629	5830	MHH 348	MHH 348	FD	0	0.08	3	111		3 UJ		219		101		331		3.11	"COLORADO STAMP MILL		N	Y	N	Y		
333	BUTSO87A	MS-017	30-Jun-87	A	DRY	1224225	741048	5468	MHH 336	MHH 336	FD	0	0.08	3	1380		29 J		1350		587		2040		6.01	"COLORADO SMELTER, M		N	Y	N	Y		
334	BUTSO87A	MS-018	30-Jun-87	A	DRY	1224260	740922	5450	MHH 339	MHH 339	FD	0	0.08	3	306		5 J		908		1840		854		2.47	"COLORADO SMELTER, M		N	Y	N	Y		
335	BUTSO87A	MS-019	30-Jun-87	A	DRY	1224125	741133	5472	MHH 361	MHH 361	FD	0	0.08	3	2530		26		6570		910		6880		2.35	"COLORADO SMELTER, M		N	Y	N	Y		
336	BUTSO87A	MS-020	01-Jul-87	A	DRY	1224093	740946	5481	MHH 388	MHH 388	FD	0	0.08	3	3560		39		2740		578		3410		6.08	"COLORADO SMELTER, M		N	Y	N	Y		
337	BUTSO87A	MS-021	07-Jul-87	A	DRY	1228447	741590	5463	MHH 831	MHH 831	FD	0	0.08	3	45		10		564		308		950		7.18	"EAST OF SUBSTATION,		Y	Y	N	Y		
338	BUTSO87A	MS-022	07-Jul-87	A	DRY	1228570	741643	5457	MHH 851	MHH 851	FD	0	0.08	3	479		12		436		254		2480		3.93	"EAST OF SUBSTATION,		N	Y	N	Y		
339	BUTSO87A	MS-023	01-Jul-87	A	DRY	1224992	743490	5454	MHH 384	MHH 384	FD	0	0.08	3	320		9		352		286		655		6.69	"MILL AT HUMANE SOC.		Y	Y	N	Y		
340	BUTSO87A	MS-024	01-Jul-87	A	DRY	1225004	743471	5448	MHH 386	MHH 386	FD	0	0.08	3	134		6		152		171		367		7.79	"MILL AT HUMANE SOC.		Y	Y	N	Y		
341	BUTSO87A	MS-026	01-Jul-87	A	DRY	1226777	744265	5519	MHH 378	MHH 378	FD	0	0.08	3	380		23		777		2710		7290		5.58	"WASHOE SAMPLING WOR		N	Y	N	Y		
342	BUTSO87A	MS-027	06-Jul-87	A	DRY	1226957	744349	5520	MHH 820	MHH 820	FD	0	0.08	3	3110		15		974		2440		372		2.96	"WASHOE SAMPLING WOR		N	Y	N	Y		
343	BUTSO87A	MS-028	06-Jul-87	A	DRY	1226538	744176	5505	MHH 802	MHH 802	FD	0	0.08	3	246		115		2060		10500		42800		5.91	"WASHOE SAMPLING WOR		N	Y	N	Y		
344	BUTSO87A	MS-029	01-Jul-87	A	DRY	1226314	745067	5551	MHH 387	MHH 387	FD	0	0.08	3	229		28		288		5970		8400		2.94	"DEXTER MILL, Map A-		N	Y	N	Y		
345	BUTSO87A	MS-030	01-Jul-87	A	DRY	1226313	745135	5551	MHH 394	MHH 394	FD	0	0.08	3	228		75		1040		8610		24500		5.27	"DEXTER MILL, Map A-		N	Y	N	Y		
346	BUTSO87A	MS-031	06-Jul-87	A	DRY	1227684	733923	5719	MHH 806	MHH 806	FD	0	0.08	3	204		294		690		632		5910		5.29	"TIMBER BUTTE MILL,		N	Y	N	Y		
347	BUTSO87A	MS-032	06-Jul-87	A	DRY	1227486	734006	5698	MHH 807	MHH 807	FD	0	0.08	3	257		12		301		362		1820		4.67	"TIMBER BUTTE MILL,		N	Y	N	Y		
348	BUTSO87A	MS-033	06-Jul-87	A	DRY	1227817	733952	5697	MHH 801	MHH 801	FD	0	0.08	3	317		34		707		1190		8960		4.49	"TIMBER BUTTE MILL,		N	Y	N	Y		
349	BUTSO87A	MS-034	06-Jul-87	A	DRY	1228087	734139	5685	MHH 815	MHH 815	FD	0	0.08	3	764		168		2710		58300		53300		4.74	"TIMBER BUTTE MILL,		Y	Y	N	Y		
350	BUTSO87A	MS-035	01-Jul-87	A	DRY	1226311	735853	5544	MHH 391	MHH 391	FD	0	0.08	3	934		17		314		1440		4640		4.11	"TIMBER BUTTE TAILIN		N	Y	N	Y		
351	BUTSO87A	MS-036	01-Jul-87	A	DRY	1226745	736788	5509	MHH 395	MHH 395	FD	0	0.08	3	200		4		761		545		1210		5.62	"TIMBER BUTTE TAILIN		N	Y	N	Y		
352	BUTSO87A	MS-037	06-Jul-87	A	DRY	1227612	734978	5587	MHH 817	MHH 817	FD	0	0.08	3	52		14		201		424		3250		5.85	"ERODED SLOPE, Map S		Y	Y	N	Y		
353	BUTSO87A	MS-037	06-Jul-87	A	DRY	1227612	734978	5587	MHH 818	MHH 818	DU	0	0.08	3	70		16		234		492		3630		5.61	"ERODED SLOPE, Map S		Y	Y	N	Y		
354	BUTSO87A	MS-038	06-Jul-87	A	DRY	1227661	737006	5501	MHH 880	MHH 880	FD	0	0.08	3	142		11		1360		360		1640		7.53	"GROVE GULCH MILL, M		Y	Y	N	Y		
355	BUTSO87A	MS-039	08-Jul-87	A	DRY	1227155	736892	5507	MHH 861	MHH 861	FD	0	0.08	3	79		4		137		157		626		6.35	"GROVE GULCH MILL, M		Y	Y	N	Y		
356	BUTSO87A	MS-040	30-Jun-87	A	DRY	1230185	748751	5715	MHH 364	MHH 364	FD	0	0.08	3	133		15		625		4400		1070		7.27	"OLD LEXINGTON, Map		Y	Y	N	Y		
357	BUTSO87A	MS-042	08-Jul-87	A	DRY	1230244	749103	5738	MHH 860	MHH 860	FD	0	0.08	3	101		19		3370		246		1750		5.69	"OLD LEXINGTON, Map	"SAME COORDINATES AS	N	Y	N	Y		
358	BUTSO87A	MS-043	07-Jul-87	A	DRY	1230447	741947	5460	MHH 841	MHH 841	FD	0	0.08	3	69		16		899		1120		2350		6.75	"KAW & GEORGE ST, M		Y	Y	N	Y		
359	BUTSO87A	MS-044	08-Jul-87	A	DRY	1232134	742860	5462	MHH 878	MHH 878	FD	0	0.08	3	212		26		1730		1120		6790		7.13	"DRIGGS & OREGON ST	OUTSIDE OPERABLE UNI	Y	Y	N	Y		
360	BUTSO87A	MS-045	30-Jun-87	A	DRY	1233740	745169	5501	MHH 346	MHH 346	FD	0	0.08	3	168		3 J		635		168		603		5.91	"PARROTT SMELTER, Ma		Y	Y	N	Y		
361	BUTSO87A	MS-046	30-Jun-87	A	DRY	1233753	745232	5502	MHH 344	MHH 344	FD	0	0.08	3	61		3 J		354		120		752		6.81	"PARROTT SMELTER, Ma		Y	Y	N	Y		
362	BUTSO87A	MS-047	30-Jun-87	A	DRY	1234165	745567	5511	MHH 367	MHH 367	FD	0	0.08	3	184		13		1140		389		977		3.56	"PARROTT SMELTER, Ma	"SAME COORDINATES AS	Y	Y	N	N		
363	BUTSO87A	MS-047	30-Jun-87	A	DRY	1234165	745567	5																									



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic mg/kg	Cadmium mg/kg	Copper mg/kg	Lead mg/kg	Zinc mg/kg	pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
407	BUTSO87A	PA-033	13-Jul-87	A	DRY	1230669	753116	6204	MHJ 961	MHJ 961	FD	0	0.08	3	62 J	10	364	956	1530	6.55	"CENTERVILLE(BENNETT)		Y	Y	R	Y	Y	
408	BUTSO87A	PA-034	13-Jul-87	A	DRY	1229463	752563	6067	MHJ 935	MHJ 935	FD	0	0.08	3	16	2 U	259	43	150	8.15	"MULLINS ST-ICERINK		N	Y	R	Y	Y	
409	BUTSO87A	PA-035	13-Jul-87	A	DRY	1229348	753613	6194	MHJ 956	MHJ 956	FD	0	0.08	3	59 J	27	715	3900	7030	3.38	"BLAINE CENTER PARK		N	Y	R	Y	Y	
410	BUTSO87A	PA-036	09-Jul-87	A	DRY	1229011	754512	6175	MHJ 932	MHJ 932	FD	0	0.08	3	40	20	219	2350	6940	5.52	"BB COURT-BLUE WING		Y	Y	R	Y	Y	
411	BUTSO87A	PA-037	13-Jul-87	A	DRY	1229784	754859	6216	MHJ 934	MHJ 934	FD	0	0.08	3	28	11	274	519	2500	6.25	"DUNN & E. DALY, Map		N	Y	R	Y	Y	
412	BUTSO87A	PA-038	13-Jul-87	A	DRY	1229812	755342	6257	MHJ 962	MHJ 962	FD	0	0.08	3	39 J	5	139	588	2170	5.82	"MCINTYRE DUMP PARK		Y	Y	R	Y	Y	
413	BUTSO87A	PA-040	14-Jul-87	A	DRY	1228892	748382	5730	MHJ 974	MHJ 974	FD	0	0.08	3	32 J	2 U	480	50	164	7.74	"PARK ST. & COLORADO		Y	Y	R	N	Y	
414	BUTSO87A	PA-040	14-Jul-87	A	DRY	1228892	748382	5730	MHJ 969	MHJ 969	DU	0	0.08	3	36 J	2 U	573	89	176	7.79	"PARK ST. & COLORADO		Y	Y	R	Y	Y	
415	BUTSO87A	PA-041	13-Jul-87	A	DRY	1230711	747552	5631	MHJ 950	MHJ 950	FD	0	0.08	3	39	6	500	1010	2500	6.02	"OHIO ST & CURTIS, M		Y	Y	R	Y	Y	
416	BUTSO87A	PA-043	13-Jul-87	A	DRY	1230041	750371	5840	MHJ 958	MHJ 958	FD	0	0.08	3	884 J	9	2480	1130	4490	4.7	"WYOMING & WOOLMAN	"IN MANDEN PART - CO	Y	Y	R	Y	Y	
417	BUTSO87A	PA-044	13-Jul-87	A	DRY	1230129	750375	5841	MHJ 986	MHJ 986	FD	0	0.08	3	110	5	1520	550	1730	6.48	"PA E. OF PA-043, Ma	"IN MANDEN PART - CO	Y	Y	R	Y	Y	
418	BUTSO87A	PA-045	13-Jul-87	A	DRY	1229558	749987	5761	MHJ 941	MHJ 941	FD	0	0.08	3	82	12	2410	1720	3460	4.75	"GAGNON & WYOMING, M		Y	Y	R	Y	Y	
419	BUTSO87A	PA-046	16-Jul-87	A	DRY	1229288	751785	5994	MHR 017	MHR 017	FD	0	0.08	3	44	12	392	984	3020	7.21	"LITTLE MNA ST., Ma		Y	Y	R	Y	Y	
420	BUTSO87A	PA-047	14-Jul-87	A	DRY	1229820	751292	5930	MHJ 981	MHJ 981	FD	0	0.08	3	130	8	1140	1150	2710	4.47	"CLEAR GRIT ST. DRAI		N	Y	R	Y	Y	
421	BUTSO87A	PA-049	26-Jun-87	A	DRY	1233953	745051	5485	MHH 310	MHH 310	FD	0	0.08	3	18 J	3 U	58	20	84		"PARROTT BALL FIELD		Y	Y	R	Y	Y	
422	BUTSO87A	PA-050	26-Jun-87	A	DRY	1233505	745034	5487	MHH 309	MHH 309	FD	0	0.08	3	9 J	3 U	52	16	91		"PARROTT BALL FIELD		Y	Y	R	Y	Y	
423	BUTSO87A	PA-051	14-Jul-87	A	DRY	1233036	745655	5518	MHJ 982	MHJ 982	FD	0	0.08	3	8	2	70	50	145	9.01	"FARRELL & GAYLORD		Y	Y	R	Y	Y	
424	BUTSO87A	PA-052	26-Jun-87	A	DRY	1231960	745645	5536	MHH 306	MHH 306	FD	0	0.08	3	45 J	5	452	480	967	7.79	"ATLANTIC & SECOND		Y	Y	R	Y	Y	
425	BUTSO87A	PA-053	26-Jun-87	A	DRY	1229810	744102	5507	MHH 308	MHH 308	FD	0	0.08	3	22 J	4	113	110	360	7.45	"FIRST & DELAWARE, M		Y	Y	R	Y	Y	
426	BUTSO87A	PA-054	14-Jul-87	A	DRY	1230353	744895	5531	MHR 007	MHR 007	FD	0	0.08	3	22	3	138	358	948	8.24	"NEVADA & SECOND, Ma		Y	Y	R	Y	Y	
428	BUTSO87A	PA-057	24-Jul-87	A	DRY	1231370	743695	5480	MHR 085	MHR 085	FD	0	0.08	3	86	11	779	7070	1380	7.5	"NEAR BN RR, Map A-2	"SAME CONCS/LOCATION	Y	Y	R	Y	Y	
429	BUTSO87A	PA-059	13-Jul-87	A	DRY	1235229	745000	5502	MHJ 938	MHJ 938	FD	0	0.08	3	117	3	1520	306	1230	7.67	"WALNUT & TEXAS, Map		Y	Y	R	Y	Y	
430	BUTSO87A	PA-060	13-Jul-87	A	DRY	1235309	744946	5494	MHJ 951	MHJ 951	FD	0	0.08	3	33	5	877	162	996	6.15	"WALNUT & TEXAS, Map		Y	Y	R	Y	Y	
431	BUTSO87A	PA-060	13-Jul-87	A	DRY	1235309	744946	5494	MHJ 949	MHJ 949	DU	0	0.08	3	36	2 U	909	162	818	5.96	"WALNUT & TEXAS, Map		Y	Y	R	Y	Y	
432	BUTSO87A	PA-061	13-Jul-87	A	DRY	1229194	752995	6134	MHJ 966	MHJ 966	FD	0	0.08	3	38 J	4	169	452	689	7.22	"MAIN & CENTER, Map		Y	Y	R	Y	Y	
433	BUTSO87A	PA-062	23-Jul-87	A	DRY	1229407	746990	5624	MHR 053	MHR 053	FD	0	0.08	3	143 J	5	192	382	1270	6.59	"MAIN & SILVER, Map		Y	Y	R	Y	Y	
436	BUTSO87A	PA-064	14-Jul-87	A	DRY	1229196	745143	5541	MHJ 995	MHJ 995	FD	0	0.08	3	50	2	162	225	708	8.01	"IRON & MAIN, Map"		Y	Y	R	Y	Y	
437	BUTSO87A	PA-065	14-Jul-87	A	DRY	1228288	735680	5535	MHJ 988	MHJ 988	FD	0	0.08	3	135	2 U	165	139	396	6.7	"CLAY & DAKOTA, Map		Y	Y	R	Y	Y	
438	BUTSO87A	PA-066	23-Jul-87	A	DRY	1230213	746171	5588	MHR 051	MHR 051	FD	0	0.08	3	71 J	6	491	841	1180	8.27	"UTAH & ALUMINUM, Ma		Y	Y	R	Y	Y	
439	BUTSO87A	RY-001	15-Jun-87	A	DRY	1225035	751442	5911	MHH 660	MHH 660	FD	0	0.08	3	70	5	349	93	315	6.29	"1020 Hornet, BUTTE		Y	Y	R	Y	Y	
440	BUTSO87A	RY-002	15-Jun-87	A	DRY	1224682	750277	5845	MHH 664	MHH 664	FD	0	0.08	3	48 J	7 J	244	801	680	6.08	"1111 W. Woolman, BU		Y	Y	R	Y	Y	
441	BUTSO87A	RY-003	15-Jun-87	A	DRY	1228457	754558	6170	MHH 647	MHH 647	FD	0	0.08	3	38	9	190	1900	1900	6.49	"200 W. Daly, WALKER		Y	Y	R	Y	Y	
442	BUTSO87A	RY-004	15-Jun-87	A	DRY	1224467	748890	5740	MHH 661	MHH 661	FD	0	0.08	3	226	7	1420	686	1070	6.2	"1117 Broadway, BUTT		Y	Y	R	Y	Y	
443	BUTSO87A	RY-005	15-Jun-87	A	DRY	1224576	746729	5607	MHH 662	MHH 662	FD	0	0.08	3	31	4	165	253	318	7.64	"1114 West Gold, BUT		Y	Y	R	Y	Y	
444	BUTSO87A	RY-006	16-Jun-87	A	DRY	1223474	746704	5643	MHH 696	MHH 696	FD	0	0.08	3	42	6	224	670	719	7.37	"1314 Gold, BUTTE, M		Y	Y	R	Y	Y	
446	BUTSO87A	RY-008	16-Jun-87	A	DRY	1228486	746570	5566	MHH 698	MHH 698	FD	0	0.08	3	33	3	168	365	877	8.09	"535 S. Dakota, BUTT		Y	Y	R	Y	Y	
448	BUTSO87A	RY-010	16-Jun-87	A	DRY	1225316	746760	5617	MHH 690	MHH 690	FD	0	0.08	3	47	6	224	463	796	7.07	"916 Gold, BUTTE, MT		Y	Y	R	Y	Y	
450	BUTSO87A	RY-012	17-Jun-87	A	DRY	1231430	745411	5537	MHH 720	MHH 720	FD	0	0.08	3	94 J	12	1070	1240	2030	7.27	"814 Second, BUTTE		Y	Y	R	Y	Y	
451	BUTSO87A	RY-013	17-Jun-87	A	DRY	1230145	744546	5523	MHH 722	MHH 722	FD	0	0.08	3	34 J	9	506	741	1400	6.87	"1010 Maryland, BUTT		Y	Y	R	Y	Y	
452	BUTSO87A	RY-014	17-Jun-87	A	DRY	1227236	740714	5474	MHH 716	MHH 716	FD	0	0.08	3	29 J	4	124	58	228	7.07	"1811 S. Washington,		Y	Y	R	Y	Y	
458	BUTSO87A	RY-022	18-Jun-87	A	DRY	1229994	754624	6234	MHH 741	MHH 741	FD	0	0.08	3	57	17	847	2320	3800	7.47	"201 Tobaggan, BUTTE		Y	Y	R	Y	Y	
461	BUTSO87A	RY-025	19-Jun-87	A	DRY	1228334	740618	5476	MHH 766	MHH 766	FD	0	0.08	3	71	8	369	220	563 J	6.45	"2222 Placer, BUTTE		Y	Y	R	Y	Y	
463	BUTSO87A	RY-027	19-Jun-87	A	DRY	1228665	754171	6096	MHH 748	MHH 748	FD	0	0.08	3	16 U	7	127	387	572	7.97	"611 Transit, BUTTE		Y	Y	R	Y	Y	
464	BUTSO87A	RY-028	19-Jun-87	A	DRY	1229494	753189	6145	MHH 749	MHH 749	FD	0	0.08	3	36	13	166	1980	2050	6.81	"19 La Platte, BUTTE		Y	Y	R	Y	Y	
469	BUTSO87A	RY-033	22-Jun-87	A	DRY	1230326	754597	6251	MHH 202	MHH 202	FD	0	0.08	3	21 J	11	184	428	2050	6.07	"227 Tobaggan, WALKER		Y	Y	R	Y	Y	
472	BUTSO87A	RY-038	23-Jun-87	A	DRY	1228584	756211	6250	MHH 222	MHH 222	FD	0	0.08	3	22	6	112	523	416	6.85	"205 Williams, WALKER		Y	Y	R	Y	Y	
473	BUTSO87A	RY-039	23-Jun-87	A	DRY	1230716	754531	6254	MHH 215	MHH 215	FD	0	0.08	3	87 J	34	771	19300	8420	3.67	"247 Tobaggan, WALKER		Y	Y	R	Y	Y	
474	BUTSO87A	RY-040	23-Jun-87	A	DRY	1230044	755014	6245	MHH 216	MHH 216	FD	0	0.08	3	63	14	206	1610	1860	5.56	"121 Capitol Hill, W		Y	Y	R	Y	Y	
475	BUTSO87A	RY-040	23-Jun-87	A	DRY	1230044	755014	6245	MHH 219	MHH 219	DU	0	0.08	3	54	13	225	1230	1960	5.75	"121 Capitol Hill, W		Y	Y	R	N	Y	
476	BUTSO87A	RY-041	25-Jun-87	A	DRY	1229685	754353	6215	MHH 296	MHH 296	FD	0	0.08	3	100 J	15	411	2540	2420	6.41	"11 Lexington, WALKER		Y	Y	R	Y	Y	
477	BUTSO87A	RY-042	25-Jun-87	A	DRY	1226162	753466	6049	MHH 270	MHH 270	FD	0	0.08	3	39	3 U	124 J	383	631 J	6.36	"815 17th, BUTTE, MT		Y	Y	R	Y	Y	
478	BUTSO87A	RY-044	25-Jun-87	A	DRY	1228109	735931	5518	MHH 280	MHH 280	FD	0	0.08	3	72	4	150 J	140	533 J	6.81	"3210 Placer, BUTTE		Y	Y	R	Y	Y	
479	BUTSO87A	RY-045	2																									



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic		Cadmium		Copper		Lead		Zinc		pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
															mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual									
515	BUTSO87A	RY-082	07-Jul-87	A	DRY	1228842	752494	6099	MHJ 848	MHJ 848	FD	0	0.08	3	6	UJ	9		168		810		1240		6.37	*101 Pacific, BUTTE		Y	Y	R	Y	Y	
516	BUTSO87A	RY-083	07-Jul-87	A	DRY	1228647	752450	6102	MHJ 839	MHJ 839	FD	0	0.08	3	58		12		264		781		1640		6.04	*121 Pacific, BUTTE		Y	Y	R	Y	Y	
517	BUTSO87A	RY-084	07-Jul-87	A	DRY	1228305	752455	6089	MHJ 850	MHJ 850	FD	0	0.08	3	48		17		272		2320		3370		6.36	*167 W. Pacific, BUT		Y	Y	R	Y	Y	
518	BUTSO87A	RY-085	08-Jul-87	A	DRY	1229539	751343	5947	MHJ 856	MHJ 856	FD	0	0.08	3	110		0 R		827		1800		3250		6.71	*107 Cleargirt, BUTT		Y	Y	R	Y	Y	
519	BUTSO87A	RY-086	08-Jul-87	A	DRY	1229910	751220	5927	MHJ 857	MHJ 857	FD	0	0.08	3	78		13		546		1920		3610		5.48	*110 Belle St., BUTT		Y	Y	R	Y	Y	
520	BUTSO87A	RY-087	08-Jul-87	A	DRY	1229923	751246	5931	MHJ 876	MHJ 876	FD	0	0.08	3	131		17		777		2030		4700		5.25	*112 Belle St., BUTT		Y	Y	R	Y	Y	
521	BUTSO87A	RY-088	08-Jul-87	A	DRY	1229833	750719	5901	MHJ 881	MHJ 881	FD	0	0.08	3	70		13		1080		1420		2490		6.38	*709 N. Wyoming, BUT		Y	Y	R	Y	Y	
522	BUTSO87A	RY-089	08-Jul-87	A	DRY	1228676	751366	5929	MHJ 859	MHJ 859	FD	0	0.08	3	84		20		434		1860		3650		5.97	*109 Ruby, BUTTE, MT		Y	Y	R	Y	Y	
523	BUTSO87A	RY-090	08-Jul-87	A	DRY	1228657	751262	5923	MHJ 870	MHJ 870	FD	0	0.08	3	29		20		254		554		5020		6.4	*107 Ruby, BUTTE, MT		Y	Y	R	Y	Y	
524	BUTSO87A	RY-091	08-Jul-87	A	DRY	1225499	749133	5761	MHJ 864	MHJ 864	FD	0	0.08	3	39		10		221		1250		2320		7.11	*917 Granite, BUTTE		Y	Y	R	Y	Y	
525	BUTSO87A	RY-092	08-Jul-87	A	DRY	1225399	750389	5854	MHJ 875	MHJ 875	FD	0	0.08	3	53		7		276		1370		1160		6.36	*918 Antimony, BUTTE		Y	Y	R	Y	Y	
526	BUTSO87A	RY-093	08-Jul-87	A	DRY	1225502	750503	5858	MHJ 873	MHJ 873	FD	0	0.08	3	43		8		333		676		1150		6.59	*913 Antimony, BUTTE		Y	Y	R	Y	Y	
527	BUTSO87A	RY-094	08-Jul-87	A	DRY	1225268	750609	5881	MHJ 879	MHJ 879	FD	0	0.08	3	24		6		191		183		456		6.53	*962 Lewisohn, BUTTE		Y	Y	R	Y	Y	
528	BUTSO87A	RY-095	09-Jul-87	A	DRY	1228223	751341	5949	MHJ 909	MHJ 909	FD	0	0.08	3	343		15 J		356 J		1630		4540 J		4.33	*804 N. Montana, BUT		Y	Y	R	Y	Y	
529	BUTSO87A	RY-096	09-Jul-87	A	DRY	1228210	751485	5970	MHJ 893	MHJ 893	FD	0	0.08	3	158		11 J		714 J		1060		4560 J		5.94	* 822 N. Montana, BU		Y	Y	R	Y	Y	
530	BUTSO87A	RY-097	09-Jul-87	A	DRY	1228407	750895	5900	MHJ 911	MHJ 911	FD	0	0.08	3	87		12		523		6670		5050		5.77	*128 Pearl, BUTTE, M		Y	Y	R	Y	Y	
531	BUTSO87A	RY-098	09-Jul-87	A	DRY	1228442	750770	5885	MHJ 900	MHJ 900	FD	0	0.08	3	70		8 J		352 J		1410		2840 J		6.02	*121 Boardman, BUTTE		Y	Y	R	Y	Y	
532	BUTSO87A	RY-099	09-Jul-87	A	DRY	1227061	749733	5799	MHJ 895	MHJ 895	FD	0	0.08	3	146		10 J		427 J		1310		2420 J		3.54	*521 Copper, BUTTE		Y	Y	R	Y	Y	
533	BUTSO87A	RY-100	09-Jul-87	A	DRY	1227990	735725	5527	MHJ 931	MHJ 931	FD	0	0.08	3	192		5		309		857		1250		6.73	*3251 Placer, BUTTE		Y	Y	R	Y	Y	
534	BUTSO87A	RY-100	09-Jul-87	A	DRY	1227990	735725	5527	MHJ 921	MHJ 921	DU	0	0.08	3	167		4		293		817		1220		6.78	*3251 Placer, BUTTE		Y	Y	R	N	Y	
535	BUTSO87A	RY-101	09-Jul-87	A	DRY	1226604	750015	5778	MHJ 897	MHJ 897	FD	0	0.08	3	71		4 J		354 J		658		1580 J		7.36	* 527 Edison St., BU		Y	Y	R	Y	Y	
536	BUTSO87A	RY-102	09-Jul-87	A	DRY	1227044	750237	5827	MHJ 898	MHJ 898	FD	0	0.08	3	51		4 J		233 J		837		1230 J		7.09	*550 Franklin, BUTTE		Y	Y	R	Y	Y	
537	BUTSO87A	RY-103	09-Jul-87	A	DRY	1227052	750275	5831	MHJ 902	MHJ 902	FD	0	0.08	3	106		4 J		551 J		1050		1330 J		6.85	*552 Franklin, BUTTE		Y	Y	R	Y	Y	
538	BUTSO87A	RY-104	09-Jul-87	A	DRY	1227057	750310	5835	MHJ 903	MHJ 903	FD	0	0.08	3	81		4 J		252 J		1210		1830 J		6.56	*554 Franklin, BUTTE		Y	Y	R	Y	Y	
539	BUTSO87A	RY-105	13-Jul-87	A	DRY	1226629	745435	5561	MHJ 965	MHJ 965	FD	0	0.08	3	91 J		8		401		1270		1470		6.98	* 619 W. Iron, BUTTE		Y	Y	R	Y	Y	
540	BUTSO87A	RY-106	13-Jul-87	A	DRY	1226682	745428	5580	MHJ 963	MHJ 963	FD	0	0.08	3	59 J		4		352		1310		1110		6.42	* 617 W. Iron, BUTTE		Y	Y	R	Y	Y	
541	BUTSO87A	RY-107	13-Jul-87	A	DRY	1225480	750042	5830	MHJ 959	MHJ 959	FD	0	0.08	3	66 J		8		286		2570		2630		6.98	* 918 W. Woolman, BU		Y	Y	R	Y	Y	
543	BUTSO87A	RY-109	13-Jul-87	A	DRY	1229514	750140	5804	MHJ 939	MHJ 939	FD	0	0.08	3	104		8		718		875		2060		6.5	*33 E. Gagnon, BUTTE		Y	Y	R	Y	Y	
544	BUTSO87A	RY-110	13-Jul-87	A	DRY	1229417	750168	5811	MHJ 979	MHJ 979	FD	0	0.08	3	63		9		464		950		2860		7.43	*27 E. Gagnon, BUTTE		Y	Y	R	Y	Y	
545	BUTSO87A	RY-111	13-Jul-87	A	DRY	1229565	750211	5800	MHJ 960	MHJ 960	FD	0	0.08	3	107 J		7		828		1220		2560		6.72	* 59 E. Gagnon, BUTT		Y	Y	R	Y	Y	
546	BUTSO87A	RY-112	13-Jul-87	A	DRY	1226853	749728	5773	MHJ 952	MHJ 952	FD	0	0.08	3	122		18		652		1840		5920		3.68	*607 Copper, BUTTE		Y	Y	R	Y	Y	
547	BUTSO87A	RY-113	13-Jul-87	A	DRY	1227237	748443	5634	MHJ 957	MHJ 957	FD	0	0.08	3	39 J		4		290		563		821		6.87	*522 Jackson, BUTTE		Y	Y	R	Y	Y	
548	BUTSO87A	RY-114	13-Jul-87	A	DRY	1227019	747669	5713	MHJ 993	MHJ 993	FD	0	0.08	3	95		5		320		549		1710		7.94	*515 W. Silver, BUTT							



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measure-ment Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic		Cadmium		Copper		Lead		Zinc		pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
															mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.									
597	BUTSO87A	RY-161	16-Jul-87	A	DRY	1225300	749417	5761	MHR 047	MHR 047	FD	0	0.08	3	35	J	3		406		404		825		7.42	"941 W. Quartz, BUTT		Y	Y	R	Y	Y	
598	BUTSO87A	RY-162	16-Jul-87	A	DRY	1225391	749354	5779	MHR 024	MHR 024	FD	0	0.08	3	39	J	3		266		595		930		6.36	"927 W. Quartz, BUTT		Y	Y	R	Y	Y	
599	BUTSO87A	RY-163	16-Jul-87	A	DRY	1225595	748974	5747	MHR 040	MHR 040	FD	0	0.08	3	57		8		529		1540		1370		6.41	"125 N. Excelsior, B		Y	Y	R	Y	Y	
604	BUTSO87A	RY-169	14-Jul-87	A	DRY	1232368	746107	5548	MHJ 991	MHJ 991	FD	0	0.08	3	170		12		1560		1450		2600		7.24	"832 Emma, BUTTE, MT		Y	Y	R	Y	Y	
605	BUTSO87A	RY-170	14-Jul-87	A	DRY	1226153	744281	5528	MHR 012	MHR 012	FD	0	0.08	3	39		5		162		258		480		8.25	"707 Indiana, BUTTE		Y	Y	R	Y	Y	
606	BUTSO87A	RY-171	14-Jul-87	A	DRY	1226569	749096	5753	MHR 003	MHR 003	FD	0	0.08	3	60		12		343		5650		2980		6.52	"647 W. Granite, BUT		Y	Y	R	Y	Y	
607	BUTSO87A	RY-172	14-Jul-87	A	DRY	1232691	746131	5539	MHJ 996	MHJ 996	FD	0	0.08	3	105		10		935		1200		2390		7.64	"1246 1/2 Short, BUT		Y	Y	R	Y	Y	
608	BUTSO87A	RY-173	14-Jul-87	A	DRY	1232566	745974	5539	MHR 011	MHR 011	FD	0	0.08	3	62		12		739		732		1610		7.05	"917 Ergo, BUTTE, MT		N	Y	R	Y	Y	
609	BUTSO87A	RY-174	14-Jul-87	A	DRY	1232769	746017	5539	MHR 002	MHR 002	FD	0	0.08	3	65		8		776		210	J	1810		7.08	"922 Ergo, BUTTE, MT		N	Y	R	Y	Y	
610	BUTSO87A	RY-175	14-Jul-87	A	DRY	1232089	746082	5556	MHJ 985	MHJ 985	FD	0	0.08	3	53		6		519		700		1560		7.05	"1121 E. Third, BUTT		N	Y	R	N	Y	
611	BUTSO87A	RY-175	14-Jul-87	A	DRY	1232089	746082	5556	MHJ 971	MHJ 971	DU	0	0.08	3	61	J	7		641		812		1780		7.75	"1121 E. Third, BUTT		N	Y	R	Y	Y	
612	BUTSO87A	RY-176	16-Jul-87	A	DRY	1232308	746207	5554	MHR 041	MHR 041	FD	0	0.08	3	67		7		672		779		1850		6.26	"817 Emma, BUTTE, MT		Y	Y	R	Y	Y	
613	BUTSO87A	RY-177	16-Jul-87	A	DRY	1232251	746039	5545	MHR 035	MHR 035	FD	0	0.08	3	45		6		533		578		1160		7.18	"835 Emma, BUTTE, MT		Y	Y	R	Y	Y	
614	BUTSO87A	RY-178	16-Jul-87	A	DRY	1232222	746101	5554	MHR 026	MHR 026	FD	0	0.08	3	89		11		934		881		2050		7.7	"815 Emma, BUTTE, MT		Y	Y	R	Y	Y	
615	BUTSO87A	RY-179	16-Jul-87	A	DRY	1226293	746024	5627	MHR 031	MHR 031	FD	0	0.08	3	63		5		296		622		967		7.59	"643 Clark, BUTTE, M		Y	Y	R	Y	Y	
616	BUTSO87A	RY-180	16-Jul-87	A	DRY	1226533	745899	5601	MHR 004	MHR 004	FD	0	0.08	3	99		7		411		485		631		7.56	"675 S. Chrysal, BU		Y	Y	R	Y	Y	
617	BUTSO87A	RY-181	16-Jul-87	A	DRY	1229311	750149	5823	MHR 028	MHR 028	FD	0	0.08	3	129		10		630		1780		2240		6.35	"21 Gagnon, BUTTE, M		Y	Y	R	Y	Y	
618	BUTSO87A	RY-182	16-Jul-87	A	DRY	1229380	750145	5820	MHR 042	MHR 042	FD	0	0.08	3	91		10		920		1910		2900		6.73	"23 Gagnon, BUTTE, M		Y	Y	R	Y	Y	
619	BUTSO87A	RY-183	24-Jul-87	A	DRY	1228532	749738	5789	MHR 086	MHR 086	FD	0	0.08	3	92		10		1160		860		2080		6.62	"111 1/2 W. Copper,		Y	Y	R	Y	Y	
620	BUTSO87A	RY-184	24-Jul-87	A	DRY	1228389	749615	5782	MHR 081	MHR 081	FD	0	0.08	3	189		13		1320		2680		2370		4.33	"118 W. Copper, BUTT	COLORADO STAMP MILL	N	Y	R	Y	Y	
621	BUTSO87A	RY-185	24-Jul-87	A	DRY	1228422	749509	5788	MHR 095	MHR 095	FD	0	0.08	3	184		34		1390		3300		10500		6.45	"111 W. Quartz, BUTT		Y	Y	R	Y	Y	
622	BUTSO87A	RY-186	24-Jul-87	A	DRY	1228505	749505	5785	MHR 090	MHR 090	FD	0	0.08	3	202		8		829		1240		1920		5.26	"107 W. Quartz, BUTT		Y	Y	R	Y	Y	
623	BUTSO87A	RY-187	24-Jul-87	A	DRY	1230402	749067	5732	MHR 087	MHR 087	FD	0	0.08	3	71		10		570		1880		1920		7.39	"243 E. Broadway, BU		Y	Y	R	Y	Y	
624	BUTSO87A	RY-188	24-Jul-87	A	DRY	1231090	748738	5694	MHR 076	MHR 076	FD	0	0.08	3	58		6		773		774		1070		5.98	"405 E. Park, BUTTE		Y	Y	R	Y	Y	
625	BUTSO87A	RY-189	24-Jul-87	A	DRY	1231254	747896	5644	MHR 098	MHR 098	FD	0	0.08	3	209		13		2510		1400		3510		6.78	"406 E. Mercury, BUT		Y	Y	R	Y	Y	
626	BUTSO87A	RY-190	24-Jul-87	A	DRY	1225863	748973	5748	MHR 077	MHR 077	FD	0	0.08	3	155		11		393		2930		2080		7.17	"830 W. Granite, BUT		Y	Y	R	Y	Y	
627	BUTSO87A	RY-191	27-Jul-87	A	DRY	1232026	748119	5634	MHR 101	MHR 101	FD	0	0.08	3	67		6		822		619		1420		6.91	"527 E. Mercury, BUT		Y	Y	R	Y	Y	
628	BUTSO87A	RY-192	27-Jul-87	A	DRY	1230983	748362	5669	MHR 110	MHR 110	FD	0	0.08	3	69		4		403		745		894		6.75	"341 E. Galena, BUTT		Y	Y	R	Y	Y	
629	BUTSO87A	RY-193	27-Jul-87	A	DRY	1226824	745447	5562	MHR 109	MHR 109	FD	0	0.08	3	67		3		306		692		779		7.17	"503 W. Iron, BUTTE		Y	Y	R	Y	Y	
630	BUTSO87A	RY-194	27-Jul-87	A	DRY	1226865	748167	5633	MHR 112	MHR 112	FD	0	0.08	3	63		2	U	273		436		598		6.66	"629 Travonia, BUTTE		Y	Y	R	Y	Y	
631	BUTSO87A	RY-195	29-Jul-87	A	DRY	1233186	745848	5521	MHR 155	MHR 155	FD	0	0.08	3	93	J	9		1300		1150		1830		6.76	"1317 E. 2nd St., BUT		Y	Y	R	Y	Y	
636	BUTSO87A	VG-001	15-Jun-87	A	DRY	1228470	754527	6167	MHH 665	MHH 665	FD	0	0.5	3	48	J	7	J	155		633		1140		7.37	"200 W. Daly St., Wa	"0-6" SAMPLE FROM V	Y	Y	R	Y	Y	
642	BUTSO87A	VG-007	23-Jun-87	A	DRY	1228574	756224	6249	MHH 227	MHH 227	FD	0	0.5	3	58		8		239		575		711		7.14	"205 Williams, Walke		Y	Y	R	Y	Y	
646	BUTSO87																																



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic		Cadmium		Copper		Lead		Zinc		pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
															mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.									
702	BUTSO87A	WD-045	10-Jun-87	A	DRY	1227444	750150	5827	MHH 606	MHH 606	FD	0	0.08	3	36		9		337		207		1020		7.26	"WEST GAGNON, Map 1-19"		N	Y	N	Y		
703	BUTSO87A	WD-046	10-Jun-87	A	DRY	1227471	750148	5824	MHH 607	MHH 607	FD	0	0.08	3	19		4		245		50		151		7.63	"WEST GAGNON, Map 1-19"		N	Y	N	Y		
704	BUTSO87A	WD-047	11-Jun-87	A	DRY	1228872	750887	5898	MHH 621	MHH 621	FD	0	0.08	3	128		21		876		2540		5590		3.79	"LATE ACQUISITION, Map 1-19"		N	Y	N	Y		
705	BUTSO87A	WD-048	11-Jun-87	A	DRY	1226926	751016	5859	MHH 624	MHH 624	FD	0	0.08	3	50		5		498		19 J		126 R		6.79	"NEW ERA, Map 1-19"		N	Y	N	Y		
706	BUTSO87A	WD-049	11-Jun-87	A	DRY	1227890	750952	5906	MHH 616	MHH 616	FD	0	0.08	3	128		16		560		1460		3560		6.49	"DOWNEY-1(NEW ERA), Map 1-19"		N	Y	N	Y		
707	BUTSO87A	WD-050	11-Jun-87	A	DRY	1227874	750863	5895	MHH 620	MHH 620	FD	0	0.08	3	32		21		130		1160		4950		8.51	"DOWNEY-1(NEW ERA), Map 1-19"		N	Y	N	Y		
708	BUTSO87A	WD-051	12-Jun-87	A	DRY	1226335	750027	5794	MHH 632	MHH 632	FD	0	0.08	3	91 U		5		277		37 J		220 R		7.32	"ANSELMO-RECLAIMED, Map 1-19"		N	Y	N	Y		
709	BUTSO87A	WD-052	17-Jun-87	A	DRY	1226155	750394	5832	MHH 702	MHH 702	FD	0	0.08	3	1400		32		1560		6730		4400		3.6	"ANSELMO-UNRECLAIMED, Map 1-19"		Y	Y	N	Y		
710	BUTSO87A	WD-053	12-Jun-87	A	DRY	1226970	752056	5919	MHH 639	MHH 639	FD	0	0.08	3	243		14		776		1620 J		4080 R		4.2	"WASTE N. OF SYN. PI, Map 1-19"		N	Y	N	Y		
711	BUTSO87A	WD-054	12-Jun-87	A	DRY	1228607	752121	6047	MHH 644	MHH 644	FD	0	0.08	3	32		5		280		156 J		257 R		7.15	"TOM GRAY AND WEST, Map 1-19"		N	Y	N	Y		
712	BUTSO87A	WD-055	12-Jun-87	A	DRY	1228604	752078	6038	MHH 631	MHH 631	FD	0	0.08	3	42		5		249		68 J		203 R		7.22	"TOM GRAY, Map 1-19"		N	Y	N	Y		
713	BUTSO87A	WD-056	15-Jun-87	A	DRY	1224956	744178	5500	MHH 651	MHH 651	FD	0	0.08	3	474		25		2320		2180		7320		7.03	"N. OF BREWER CLAIM, Map 1-19"		N	Y	N	Y		
714	BUTSO87A	WD-057	15-Jun-87	A	DRY	1225035	745571	5553	MHH 646	MHH 646	FD	0	0.08	3	170		4		349		184		377		6.73	"BOHANZA, Map A-19"		N	Y	N	Y		
715	BUTSO87A	WD-058	15-Jun-87	A	DRY	1226419	745634	5597	MHH 655	MHH 655	FD	0	0.08	3	294 U		6		129		500		1020		6.47	"TRAVONA, Map A-19"		N	Y	N	Y		
716	BUTSO87A	WD-059	15-Jun-87	A	DRY	1226594	745531	5582	MHH 657	MHH 657	FD	0	0.08	3	175		7		567				1020		5.81	"TRAVONA, Map A-19"		N	Y	N	Y		
717	BUTSO87A	WD-060	16-Jun-87	A	DRY	1225917	745832	5595	MHH 679	MHH 679	FD	0	0.08	3	800 J		8 J		313		420		1090		8.53	"TRAVONA, Map A-19"		N	Y	N	Y		
718	BUTSO87A	WD-061	16-Jun-87	A	DRY	1228623	744897	5539	MHH 675	MHH 675	FD	0	0.08	3	244 J		27 J		606		3360		9540		6.03	"OPHIR, Map A-19"		N	Y	N	Y		
719	BUTSO87A	WD-062	16-Jun-87	A	DRY	1229041	752652	6092	MHH 691	MHH 691	FD	0	0.08	3	89		29		417		7800		7260		4.27	"OLD GLORY INCLINE, Map 1-19"		N	Y	N	Y		
720	BUTSO87A	WD-063	16-Jun-87	A	DRY	1229369	754008	6221	MHH 681	MHH 681	FD	0	0.08	3	139 J		16 J		910		2460		4340		4.5	"LEXINGTON DUMP, Map 1-19"		Y	Y	R	Y	Y	
721	BUTSO87A	WD-064	16-Jun-87	A	DRY	1229271	753750	6193	MHH 685	MHH 685	FD	0	0.08	3	246 U		28		534		2070		7600		4.33	"LEXINGTON DUMP, Map 1-19"		N	Y	N	Y		
722	BUTSO87A	WD-065	16-Jun-87	A	DRY	1229408	754170	6213	MHH 686	MHH 686	FD	0	0.08	3	144		35		1060		6530		9240		4.22	"LEXINGTON DUMP, Map 1-19"		Y	Y	N	Y		
723	BUTSO87A	WD-066	17-Jun-87	A	DRY	1230367	755532	6282	MHH 705	MHH 705	FD	0	0.08	3	58		19 J		184		1320		5500		5.32	"MAGNA CARTA, Map Q-19"		N	Y	N	Y		
724	BUTSO87A	WD-066	17-Jun-87	A	DRY	1230367	755532	6282	MHH 703	MHH 703	DU	0	0.08	3	49		17 J		146		1050		4840		5.48	"MAGNA CARTA, Map Q-19"		N	Y	N	Y		
725	BUTSO87A	WD-067	18-Jun-87	A	DRY	1231427	753595	6269	MHH 738	MHH 738	FD	0	0.08	3	367		22		1720		3690		5090		2.72	"SILVER QUEEN, Map Q-19"		Y	Y	N	Y		
726	BUTSO87A	WD-068	29-Jun-87	A	DRY	1231084	753200	6238	MHH 314	MHH 314	FD	0	0.08	3	63		11		517		1360		2650		3.16	"WEST GRAY ROCK, Map 1-19"		N	Y	N	Y		
727	BUTSO87A	WD-069	18-Jun-87	A	DRY	1231787	753408	6236	MHH 731	MHH 731	FD	0	0.08	3	505 J		12		2290		1960		2260		2.51	"PENROSE, Map Q-27"		Y	Y	N	Y		
728	BUTSO87A	WD-070	18-Jun-87	A	DRY	1231738	753071	6239	MHH 726	MHH 726	FD	0	0.08	3	205 J		7		954		902		796		2.43	"EAST GRAY ROCK, Map 1-19"	ACTIVE MINING AREA I	Y	Y	N	Y		
729	BUTSO87A	WD-071	17-Jun-87	A	DRY	1231330	753923	6311	MHH 701	MHH 701	FD	0	0.08	3	124		23		1050		5510		4930		2.82	"ROCK ISLAND, Map Q-19"		Y	Y	N	Y		
730	BUTSO87A	WD-072	17-Jun-87	A	DRY	1231645	753791	6271	MHH 704	MHH 704	FD	0	0.08	3	190		21 J		679		5970		4280		2.88	"CORRA, Map Q-27"		Y	Y	N	Y		
731	BUTSO87A	WD-073	17-Jun-87	A	DRY	1231101	754441	6315	MHH 700	MHH 700	FD	0	0.08	3	72		76		1520		8930		18200		2.79	"CORRA-2, Map Q-27"	IN RECLAIMED AREA EA	N	Y	N	Y		
732	BUTSO87A	WD-074	18-Jun-87	A	DRY	1231421	753542	6281	MHH 740	MHH 740	FD	0	0.08	3	397		18		1440		2630		3610		2.07	"SILVER QUEEN, Map Q-19"		Y	Y	N	Y		
733	BUTSO87A	WD-075	10-Jun-87	A	DRY	1231329	755148	6373	MHH 610	MHH 610	FD	0	0.08	3	128		42		314		2210		10000		5.35	"MOOSE, Map Q-27"		Y	Y	N	Y		
734	BUTSO87A	WD-076	10-Jun-87	A	DRY	1231374	755216	6377	MHH 611	MHH 611	FD	0	0.08	3	108		36		360		3200		7220		5.85	"MOOSE, Map Q-27"		Y	Y	N	Y		



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic mg/kg	Arsenic Qual.	Cadmium mg/kg	Cadmium Qual.	Copper mg/kg	Copper Qual.	Lead mg/kg	Lead Qual.	Zinc mg/kg	Zinc Qual.	pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
781	BUTSO93A	PSERA9308	01-Apr-93	PSERA9308	DRY	1229576	751821	6009			FD	0	0.17	4	144		2	386		6660		3290		4.58	Site #13-near Little		U	N	Y	N	Y		
782	BUTSO93A	PSERA9309	01-Apr-93	PSERA9309	DRY	1229828	751312	5955			FD	0	0.17	4	84		5	282		497		885		4.43	Site #13-near Little		U	N	Y	N	Y		
783	BUTSO93A	PSERA9310	01-Apr-93	PSERA9310	DRY	1229911	751157	5942			FD	0	0.17	4	43		2	326		280		635		5.34	Area SE of house-bel		U	Y	Y	N	Y		
784	BUTSO93A	PSERA9311	01-Apr-93	PSERA9311	DRY	1228356	750662	5873			FD	0	0.17	4	139		4	464		3630		1200		3.8	Site #20-S of Sutter		U	N	Y	N	Y		
785	BUTSO93A	PSERA9312	01-Apr-93	PSERA9312	DRY	1228314	749629	5774			FD	0	0.17	4	50		2	280		2020		700		3.45	Site #26-Old Colorado	COLORADO STAMP MILL	U	N	Y	N	Y		
786	BUTSO93A	PSERA9313	01-Apr-93	PSERA9313	DRY	1226633	754536	6139			FD	0	0.17	4	35		3	53		1060		980		5.75	Hanson & 6th-Walker		U	N	Y	N	Y		
787	BUTSO93A	PSERA9314	01-Apr-93	PSERA9314	DRY	1226318	754317	6121			FD	0	0.17	4	2		0	6		0		36		7.23	West Walkerville		U	Y	Y	N	Y		
788	BUTSO93A	PSERA9315	01-Apr-93	PSERA9315	DRY	1228009	754532	6198			FD	0	0.25	4	94		6	645		10600		9750		6.15	Jangula yard-Walkerv		U	Y	Y	R	Y	Y	
789	BUTSO93A	PSERA9316	01-Apr-93	PSERA9316	DRY	1228067	754445	6198			FD	0	0.25	4	37		0	700		17100		3200		4.59	Jangula Alley-Walker		U	Y	Y	R	Y	Y	
790	BUTSO93A	PSERA9317	01-Apr-93	PSERA9317	DRY	1231444	746193	5547			FD	0	0.17	4	200		13	2820		670		1820		6.99	818 S. Arizona		U	Y	Y	N	Y		
792	BUTSO89A	BF-003	23-Jun-87	BF-003	WET	1225811	753579	0			FD			2	36 J		7	268		647		1340			RR GRADE MATERIALS		A	N	N	N	Y		
793	BUTSO89A	BF-004	23-Jun-87	BF-004	WET	1227554	747846	0			FD			2	2 J		13	1100		518		1230			B.A. & P. RR - NEAR		A	N	N	N	Y		
794	BUTSO89A	BF-006	23-Jun-87	BF-006	WET	1228242	751435	0			FD			2	263 J		18	1200		1330		3500			B.A. & P. RR - MONTA		A	N	N	N	Y		
795	BUTSO89A	BF-008	25-Jun-87	BF-008	WET	1225070	749671	0			FD			2	414		16	3170 J		909		4470 J			B.A. & P. RR - COPPE		A	N	N	N	Y		
796	BUTSO89A	DR-006	03-Aug-87	DR-006	WET	1228329	742358	0			FD			2	113 J		5	276		708		1910			NEAR MONTANA AVE - J		A	N	N	N	Y		
797	BUTSO89A	MS-049	24-Jul-87	MS-049	WET	1230135	743656	0			FD			2	146		25	2050		1080		4060			OLD BUTTE SAMPLING W		A	N	N	N	Y		
798	BUTSO89A	PA-057	24-Jul-87	PA-057	WET	1231367	743775	0			FD			2	86		11	779		7070		1380			NEAR BN RR - BY MONT		A	N	N	N	Y		
799	BUTSO90A	CO TAIL R	13-Jun-90	CTR-1		1222700	742135	0			FD			2	175 J		0	0		1336 J		0		4.03	SEE FIG. 1-30		R	N	N	N	N		
800	BUTSO90A	CO TAIL R	13-Jun-90	CTR-10		1222700	742135	0			FD			2	262 J		0	0		78 J		0		4.03	SEE FIG. 1-30		R	N	N	N	N		
801	BUTSO90A	CO TAIL R	13-Jun-90	CTR-11		1222700	742135	0			FD			2	474 J		0	0		104 J		0		4.03	SEE FIG. 1-30		R	N	N	N	N		
802	BUTSO90A	CO TAIL R	13-Jun-90	CTR-12		1222700	742135	0			FD			2	85 J		0	0		105 J		0		4.03	SEE FIG. 1-30		R	N	N	N	N		
803	BUTSO90A	CO TAIL R	13-Jun-90	CTR-13		1222700	742135	0			FD			2	244 J		0	0		1575 J		0		4.03	SEE FIG. 1-30		R	N	N	N	N		
804	BUTSO90A	CO TAIL R	13-Jun-90	CTR-14		1222700	742135	0			FD			2	351 J		0	0		1542 J		0		4.03	SEE FIG. 1-30		R	N	N	N	N		
805	BUTSO90A	CO TAIL R	13-Jun-90	CTR-15		1222700	742135	0			FD			2	455 J		0	0		72 J		0		4.03	SEE FIG. 1-30		R	N	N	N	N		
806	BUTSO90A	CO TAIL R	13-Jun-90	CTR-16		1222700	742135	0			FD			2	307 J		0	0		80 J		0		4.03	SEE FIG. 1-30		R	N	N	N	N		
807	BUTSO90A	CO TAIL R	13-Jun-90	CTR-17		1222700	742135	0			FD			2	17 J		0	0		2 UJ		0		4.03	SEE FIG. 1-30		R	N	N	N	N		
808	BUTSO90A	CO TAIL R	13-Jun-90	CTR-18		1222700	742135	0			FD			2	28 J		0	0		3 J		0		4.03	SEE FIG. 1-30		R	N	N	N	N		
809	BUTSO90A	CO TAIL R	13-Jun-90	CTR-19		1222700	742135	0			FD			2	339 J		0	0		146 J		0		4.03	SEE FIG. 1-30		R	N	N	N	N		
810	BUTSO90A	CO TAIL R	13-Jun-90	CTR-2		1222700	742135	0			FD			2	345 J		0	0		824 J		0		4.03	SEE FIG. 1-30		R	N	N	N	N		
811	BUTSO90A	CO TAIL R	13-Jun-90	CTR-3		1222700	742135	0			FD			2	95 J		0	0		91 J		0		4.03	SEE FIG. 1-30		R	N	N	N	N		
812	BUTSO90A	CO TAIL R	13-Jun-90	CTR-4		1222700	742135	0			FD			2	26 J		0	0		3 J		0		4.03	SEE FIG. 1-30		R	N	N	N	N		
813	BUTSO90A	CO TAIL R	13-Jun-90	CTR-5		1222700	742135	0			FD			2	220 J		0	0		2801 J		0		4.03	SEE FIG. 1-30		R	N	N	N	Y		
814	BUTSO90A	CO TAIL R	13-Jun-90	CTR-6		1222700	742135	0			FD			2	597 J		0	0		76 J		0		4.03	SEE FIG. 1-30		R	N	N	N	N		
815	BUTSO90A	CO TAIL R	13-Jun-90	CTR-7		1222700	742135	0			FD			2	537 J		0	0		144 J		0		4.03	SEE FIG. 1-30		R	N	N	N	N		
816	BUTSO90A	CO TAIL R	13-Jun-90	CTR-8		1222700	742135	0			FD			2	1370 J		0	0		194 J		0		4.03	SEE FIG. 1-30		R	N	N	N	N		
817	BUTSO90A	CO TAIL R	13-Jun-90	CTR-9		1222700	742135	0			FD			2	359 J		0	0		302 J		0		4.03	SEE FIG. 1-30		R	N	N	N	N		
818	BUTSO90B	TB-SO-01	06-Mar-90	TB-SO-01	DRY	1226416	754742	0			FD	0	0.17	2	57		7	142		2140		2300		4.2	RISING STAR - TOP TI	*SAME COORDINATES AS	B	Y	Y	N	Y		
819	BUTSO90B	TB-SO-02	06-Mar-90	TB-SO-02	DRY	1226416	754742	0			FD	0	0.17	2	100		11	193		3880		3780		3.5	RISING STAR - TOP TI	*SAME COORDINATES AS	B	Y	Y	N	Y		
820	BUTSO90B	TB-SO-03	06-Mar-90	TB-SO-03	DRY	1226416	754742	0			FD	0	0.17	2	138		9	174		5410		2890		3.1	RISING STAR - TOP TI	*SAME COORDINATES AS	B	Y	Y	N	Y		
821	BUTSO90B	TB-SO-04	06-Mar-90	TB-SO-04	DRY	1226850	754727	0			FD	0	0.17	2	133		6	301		7150		1260		4.4	RISING STAR - BEHIND	*SAME COORDINATES AS	B	Y	Y	N	Y		
822	BUTSO90B	TB-SO-05	06-Mar-90	TB-SO-05	DRY	1227495	754738	0			FD	0	0.17	2	73		4	137		1190		815		4.6	RISING STAR - EAST S		B	Y	Y	N	Y		
823	BUTSO90B	TB-SO-06	06-Mar-90	TB-SO-06	DRY	1227246	755457	0			FD	0	0.17	2	112		18	306		4650		5440		5.1	AMY		B	N	Y	N	Y		
824	BUTSO90B	TB-SO-07	06-Mar-90	TB-SO-07	DRY	1230141	755463	0			FD	0	0.17	2	78		5	44		989		2500		3	MAGNA CARTA - YELLOW	*SAME COORDINATES AS	B	Y	Y	R	Y	Y	
825	BUTSO90B	TB-SO-08	06-Mar-90	TB-SO-08	DRY	1230141	755463	0			FD	0	0.17	2	25		6	126		303		4190		5.9	MAGNA CARTA - GRAY/B	*SAME COORDINATES AS	B	Y	Y	R	Y	Y	
826	BUTSO90B	TB-SO-09	06-Mar-90	TB-SO-09	DRY	1230141	755463	0			FD	0	0.17	2	13		6	93		823		1070		5.5	MAGNA CARTA - VEGETA	*SAME COORDINATES AS	B	Y	Y	R	Y	Y	
827	BUTSO90B	TB-SO-10	06-Mar-90	TB-SO-10	DRY	1230646	754155	0			FD	0	0.17	2	124		7	800		1070		1900		4.6	INACTIVE RAILBED AND		B	N	Y	N	Y		
828	BUTSO90B	TB-SO-11	06-Mar-90	TB-SO-11	DRY	1230222	754294	0			FD	0	0.17	2	53		13	549		12700		2500		4.8	ATLANTIC 1		B	N	Y	N	Y		
829	BUTSO90B	TB-SO-12	06-Mar-90	TB-SO-12	DRY	1230186	753083	0			FD	0	0.17	2	66		37	350		4280		9770		3.8	SOUTHWEST OF LOWEYS		B	Y	Y	R	Y	Y	
830	BUTSO90B	TB-SO-13	06-Mar-90	TB-SO-13	DRY	1229075	751314	0			FD	0	0.17	2	362		5	1310		601		1850		5.4	UPPER SET OF RAIL TR		B	Y	Y	N	Y		
831	BUTSO90B	TB-SO-14	06-Mar-90	TB-SO-14	DRY	1228953	750887	0			FD	0	0.17	2	233		1	1470		142		810		3.8	LOWER HILLSIDE	*SAME COORDINATES AS	B	Y	Y	N	Y		
832	BUTSO90B	TB-SO-15	06-Mar-90	TB-SO-15	DRY	1228953	750887	0			FD	0	0.17	2	353		5	1660		727		1960		4.4	LOWER SET OF RAIL TR	*SAME COORDINATES AS	B	Y	Y	N	Y		
833	BUTSO90B	TB-SO-16	06-Mar-90	TB-SO-16	DRY	1228738	750666	0			FD	0	0.17	2	522		4	1300		1880		1280											



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic mg/kg Qual	Cadmium mg/kg Qual	Copper mg/kg Qual	Lead mg/kg Qual	Zinc mg/kg Qual	pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
857	BUTSO91A	BGM004-00	08-May-91	BGM004-MI	DRY	1225772	743926	5490		BGM004-006	DU	0	0.17	2	1360 J	24	4440	1430	9750		Railroad grade		B	Y	Y	N	Y	
858	BUTSO91A	BGM005-00	09-May-91	BGM005-MI	DRY	1226610	744131	0		BGM005-MIX	FD	0	0.17	2	2480 J	73	9600	1930	17200		Railroad grade		B	Y	Y	N	Y	
859	BUTSO91A	BGM006-00	09-May-91	BGM006-MI	DRY	1230111	745316	5530		BGM006-MIX	FD	0	0.17	2	440 J	6	3250	665	2260		Railroad grade		B	Y	Y	N	Y	
860	BUTSO91A	BGM2-0230	08-May-91	BGM002-02	DRY	1223030	743911	5470		BGM002-023OP	FD	0	0.17	2	358	2	2000	389	1680		Railroad grade		B	Y	Y	N	Y	
861	BUTSO91A	BGM3-0230	08-May-91	BGM003-02	DRY	1223932	743735	5490		BGM003-023OP	FD	0	0.17	2	1900	30	4680	1860	13100		Railroad grade		B	Y	Y	N	Y	
862	BUTSO91A	BGM3-0450	08-May-91	BGM003-04	DRY	1224610	743802	5480		BGM003-045OP	FD	0	0.17	2	5370	203	217000	9740	59700		Railroad grade		B	Y	Y	N	Y	
863	BUTSO91A	BGM4-0230	08-May-91	BGM004-02	DRY	1225637	743940	5490		BGM004-023OP	FD	0	0.17	2	403	1 U	2650 J	108	140		Railroad grade		B	Y	Y	N	Y	
864	BUTSO91A	BGM4-0340	08-May-91	BGM004-03	DRY	1225815	743970	5495		BGM004-034OP	FD	0	0.17	2	179	3	1710 J	542	1400		Railroad grade		B	Y	Y	N	Y	
865	BUTSO91A	BGM5-0230	09-May-91	BGM005-02	DRY	1226794	744253	5505		BGM005-023OP	FD	0	0.17	2	243 J	4	516	355	1280		Railroad grade		B	N	Y	N	Y	
866	BUTSO91A	BHP001-00	13-May-91	BHP001-MI	DRY	1224049	748078	5730		BHP001-MIX	FD	0	0.17	2	615	8	3330	472	2830		Railroad grade		B	Y	Y	N	Y	
867	BUTSO91A	BHP002-00	14-May-91	BHP002-MI	DRY	1224692	749512	5760		BHP002-MIX	FD	0	0.17	2	625 J	9	2520	766	1620		Railroad grade		B	Y	Y	N	Y	
868	BUTSO91A	BHP003-00	14-May-91	BHP003-MI	DRY	1226005	750246	5795		BHP003-MIX	FD	0	0.17	2	346 J	12	1820	1140	3620		Railroad grade		B	Y	Y	N	N	
869	BUTSO91A	BHP003-00	14-May-91	BHP003-MI	DRY	1226005	750246	5795		BHP003-006	DU	0	0.17	2	396 J	20	2310	3520	6090		Railroad grade		B	Y	Y	N	Y	
870	BUTSO91A	BHP004-00	14-May-91	BHP004-MI	DRY	1226938	750759	5830		BHP004-MIX	FD	0	0.17	2	175 J	6	830	682	2100		Railroad grade		B	Y	Y	N	Y	
871	BUTSO91A	BHP005-00	14-May-91	BHP005-MI	DRY	1226170	750527	5865		BHP005-MIX	FD	0	0.17	2	105 J	4	494	691	1150		Railroad grade		B	Y	Y	N	Y	
872	BUTSO91A	BHP006-00	14-May-91	BHP006-MI	DRY	1229544	750960	5890		BHP006-MIX	FD	0	0.17	2	355 J	9	3220	757	2890		Railroad grade		B	Y	Y	N	Y	
873	BUTSO91A	BHP06-0230	14-May-91	BHP006-02	DRY	1229426	750912	5890		BHP006-023OP	FD	0	0.17	2	10 J	2	315	168	522		Railroad grade		B	Y	Y	N	Y	
874	BUTSO91A	BHPSRM-1	14-May-91	BHP-SRM-1	DRY	1226927	750936	0		BHP-SRM-1-G1	FD	0	0.17	2	174 J	10	392	7990	3690		Railroad grade		B	N	Y	N	Y	
875	BUTSO91A	BHPSRM-2	14-May-91	BHP-SRM-1	DRY	1228925	750865	0		BHP-SRM-1-G1	FD	0	0.17	2	54	14	325	859	7110		Railroad grade		B	Y	Y	N	Y	
876	BUTSO91A	BN001-003	06-May-91	BN001-MIX	DRY	1226360	740641	5450		BN001-MIX	FD	0	0.17	2	54	1 U	287 J	71	198		Railroad grade		B	Y	Y	N	Y	
877	BUTSO91A	BN001-003	06-May-91	BN001-MIX	DRY	1226360	740641	5450		BN001-006	DU	0	0.17	2	51	1 U	356 J	67	177		Railroad grade		B	Y	Y	N	N	
878	BUTSO91A	BN002-003	07-May-91	BN002-MIX	DRY	1227783	740213	5460		BN002-MIX	FD	0	0.17	2	185	6	430 J	285	1990		Railroad grade		B	Y	Y	R	Y	Y
879	BUTSO91A	BN003-003	07-May-91	BN003-MIX	DRY	1228897	738892	5470		BN003-MIX	FD	0	0.17	2	54	3	319 J	186	722		Railroad grade		B	Y	Y	R	Y	Y
882	BUTSO91A	BN1-034OP	06-May-91	BN001-034	DRY	1226548	740587	5450		BN001-034OP	FD	0	0.17	2	366	9 U	1080 J	115	199		Railroad grade		B	Y	Y	N	Y	
883	BUTSO91A	BN3-045OP	07-May-91	BN003-045	DRY	1229168	738435	5465		BN003-045OP	FD	0	0.17	2	502	1 U	2680 J	21	243		Railroad grade		B	Y	Y	R	Y	Y
885	BUTSO91A	CON001-00	15-May-91	CON001-MI	DRY	1227680	751721	5965		CON001-MIX	FD	0	0.17	2	261 J	14	1130	851	4480		Railroad grade		B	Y	Y	N	Y	
886	BUTSO91A	CON002-00	15-May-91	CON002-MI	DRY	1228801	751890	5990		CON002-MIX	FD	0	0.17	2	297 J	11	1900	1040	3620		Railroad grade		B	Y	Y	N	Y	
887	BUTSO91A	CON003-00	15-May-91	CON003-MI	DRY	1228062	751457	5955		CON003-MIX	FD	0	0.17	2	92	4	579 J	294	1370 J		Railroad grade		B	Y	Y	N	Y	
888	BUTSO91A	CON004-00	15-May-91	CON004-MI	DRY	1229603	751194	5915		CON004-MIX	FD	0	0.17	2	90	6	588 J	504	2680 J		Railroad grade		B	Y	Y	N	Y	
889	BUTSO91A	CON3-0230	15-May-91	CON003-02	DRY	1226161	751428	5950		CON003-023OP	FD	0	0.17	2	106 J	5	643	1360	1100		Railroad grade		B	N	Y	N	Y	
890	BUTSO91A	MTW001-00	06-May-91	MTW001-MI	DRY	1231173	745805	5540		MTW001-MIX	FD	0	0.17	2	1130 J	30	23700	1840	5770		Railroad grade		B	Y	Y	N	Y	
891	BUTSO91A	MTW002-00	06-May-91	MTW002-MI	DRY	1232524	746558	5530		MTW002-MIX	FD	0	0.17	2	467	26	3240	735	5490		Railroad grade		B	Y	Y	N	Y	
892	BUTSO91A	MTW003-00	06-May-91	MTW003-MI	DRY	1233049	746470	5520		MTW003-MIX	FD	0	0.17	2	364	267	17090	3880	62800		Railroad grade		B	Y	Y	N	Y	
893	BUTSO91A	MTW004-00	10-May-91	MTW004-MI	DRY	1233249	747022	5540		MTW004-MIX	FD	0	0.17	2	467	20	3070	914	1780		Railroad grade		B	Y	Y	N	Y	
894	BUTSO91A	MTW005-00	10-May-91	MTW005-MI	DRY	1231341	746659	5565		MTW005-MIX	FD	0	0.17	2	182	15	1210	1430	4460		Railroad grade		B	Y	Y	N	Y	
895	BUTSO91A	MTW006-00	10-May-91	MTW006-MI	DRY	1232662	747601	5580		MTW006-MIX	FD	0	0.17	2	161	7	1170	554	2180		Railroad grade		B	Y	Y	N	Y	
896	BUTSO91A	MTW007-00	13-May-91	MTW007-MI	DRY	1231747	747302	5580		MTW007-MIX	FD	0	0.17	2	285	17	3130	1250	3560		Railroad grade		B	Y	Y	N	Y	
897	BUTSO91A	MTW008-00	13-May-91	MTW008-MI	DRY	1230905	746997	5585		MTW008-MIX	FD	0	0.17	2	116	9	988	916	2390		Railroad grade		B	Y	Y	N	Y	
898	BUTSO91A	MTW009-00	13-May-91	MTW009-MI	DRY	1232331	747625	5580		MTW009-MIX	FD	0	0.17	2	277	11	2970	910	3230		Railroad grade		B	Y	Y	N	Y	
899	BUTSO91A	MTW010-10	16-May-91	MTW010-00	DRY	1225887	740036	5460		MTW010-001OP	FD	0	0.17	2	426	5	297 J	1090	1840 J		Railroad grade		B	Y	Y	N	Y	
900	BUTSO91A	MTW010-20	16-May-91	MTW010-00	DRY	1226036	738411	5495		MTW010-002OP	FD	0	0.17	2	71	2	132 J	144	656 J		Railroad grade		B	Y	Y	N	Y	
901	BUTSO91A	MTW010-30	16-May-91	MTW010-00	DRY	1226631	737554	5510		MTW010-003OP	FD	0	0.17	2	98	3	89 J	256	1010 J		Railroad grade		B	Y	Y	N	Y	
902	BUTSO91A	MTW010-40	16-May-91	MTW010-00	DRY	1226898	737152	5505		MTW010-004OP	FD	0	0.17	2	250	9	1710 J	551	2660 J		Railroad grade		B	Y	Y	N	Y	
903	BUTSO91A	MTW010-50	16-May-91	MTW010-00	DRY	1227070	736667	5500		MTW010-005OP	FD	0	0.17	2	154	5	359 J	318	1660 J		Railroad grade		B	Y	Y	N	Y	
904	BUTSO91A	MTW010-60	16-May-91	MTW010-00	DRY	1227616	736311	5500		MTW010-006OP	FD	0	0.17	2	168	4	314 J	304	1030 J		Railroad grade		B	Y	Y	N	Y	
905	BUTSO91A	MTW010-70	16-May-91	MTW010-00	DRY	1228393	736791	5490		MTW010-007OP	FD	0	0.17	2	25	1	55 J	48	136 J		Railroad grade	OUTSIDE OPERABLE UNI	B	N	N	N	Y	
908	BUTSO91A	MTW1-0450	09-May-91	MTW001-04	DRY	1231509	745848	5530		MTW001-045OP	FD	0	0.17	2	73 J	4	427	387	925		Railroad grade		B	Y	Y	N	Y	
910	BUTSO91A	MTW2-0340	06-May-91	MTW002-03	DRY	1232569	746605	5530		MTW002-034OP	FD	0	0.17	2	2070 J	56100	92600	3300	13800		Railroad grade		B	Y	Y	N	Y	
911	BUTSO91A	MTW5-0230	10-May-91	MTW005-02	DRY	1231222	746467	5560		MTW005-023OP	FD	0	0.17	2	200	2	460	2670	1540		Railroad grade		B	Y	Y	N	Y	
912	BUTSO91A	MTW6-0450	10-May-91	MTW006-04	DRY	1233095	747610	5570		MTW006-045OP	FD	0	0.17	2	24	1	1220	88	534		Railroad grade		B	Y	Y	N	Y	
913	BUTSO91A	MTW9-0230	13-May-91	MTW009-02	DRY	1232185	747697	5590		MTW009-023OP	FD	0	0.17	2	160	9	771	1600	4020		Railroad grade		B	N	Y	N	Y	
914	CFUSO83A	ALICE	10-Jun-82	ALICE		1227877	755042	0			FD	0	1	2	88	2	0	482	0	3.3			R	N	N	N	Y	
915	CFUSO83A	ALICE	10-Jun-82	ALICE		1227877	755042	0</																				



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measure-ment Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic mg/kg	Qual.	Cadmium mg/kg	Qual.	Copper mg/kg	Qual.	Lead mg/kg	Qual.	Zinc mg/kg	Qual.	pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
938	CFUSO88A	RVM-122	01-Jan-89	89S-031	DRY	1226135	751838	0			FD	0	0.5	2	60		1		25		64		128		7.5	BUFFALO SITE RECLAIM		B	N	N	N	Y	
939	CFUSO88A	RVM-122	01-Jan-90	90S-122	DRY	1228135	751838	0			FD	0	0.5	2	1		0		14		10		13		7.6	BUFFALO SITE RECLAIM		B	N	N	N	N	
940	CFUSO88A	RVM-123	01-Jan-90	90S-123	DRY	1226358	751859	0			FD	0	0.5	2	4		1		28		95		216		7.7	BUFFALO SITE RECLAIM		B	N	N	N	Y	
941	CFUSO88A	RVM-124	01-Jan-90	90S-124/1	DRY	1228604	752093	0			FD	0	0.5	2	2		0		14		10		12		7.8	BUFFALO SITE RECLAIM		B	N	N	N	Y	
942	CFUSO88A	RVM-125	01-Jan-89	89S-032/0	DRY	1228604	752258	0			FD	0	0.5	2	40		0		39		18		19		6.5	BUFFALO SITE RECLAIM		B	N	N	N	Y	
943	CFUSO88A	RVM-125	01-Jan-90	90S-125	DRY	1228804	752258	0			FD	0	0.5	2	1		0		6		4		7		7.2	BUFFALO SITE RECLAIM		B	N	N	N	N	
944	CFUSO88A	RVM-126	01-Jan-90	90S-126	DRY	1228848	751975	0			FD	0	0.5	2	1		0		10		1		7		6.1	BUFFALO SITE RECLAIM		B	N	N	N	Y	
945	CFUSO88A	RVM-127	01-Jan-90	90S-127	DRY	1229024	752106	0			FD	0	0.5	2	1		0		8		1		3		6.9	BUFFALO SITE RECLAIM		B	N	N	N	Y	
946	CFUSO88A	RVM-128	01-Jan-90	90S-128	DRY	1226741	751755	0			FD	0	0.5	2	1		0		22		7		41		7.3	BUFFALO SITE RECLAIM		B	N	N	N	Y	
947	CFUSO88A	RVM-129	01-Jan-90	90S-129	DRY	1228858	751707	0			FD	0	0.5	2	1		0		11		2		3		7.4	BUFFALO SITE RECLAIM		B	N	N	N	Y	
948	CFUSO88A	RVM-130	01-Jan-89	89S-033	DRY	1228968	751838	0			FD	0	0.5	2	48		1		25		52		82		7.5	BUFFALO SITE RECLAIM		B	N	N	N	Y	
949	CFUSO88A	RVM-130	01-Jan-90	90S-130	DRY	1228968	751838	0			FD	0	0.5	2	0		0		10		3		3		7.8	BUFFALO SITE RECLAIM		B	N	N	N	N	
950	CFUSO88A	RVM-131	01-Jan-89	89S-034	DRY	1227515	751742	0			FD	0	0.5	2	10		0		10		5		4		7.5	UPPER ANSELMO RECLAI		B	N	N	N	N	
951	CFUSO88A	RVM-131	01-Jan-90	90S-131	DRY	1227515	751742	0			FD	0	0.5	2	1		0		11		7		2		7.8	UPPER ANSELMO RECLAI		B	N	N	N	Y	
952	CFUSO88A	RVM-132	01-Jan-90	90S-132	DRY	1227377	751707	0			FD	0	0.5	2	0		0		7		1		2		7.6	UPPER ANSELMO RECLAI		B	N	N	N	Y	
953	CFUSO88A	RVM-133	01-Jan-89	89S-035	DRY	1227350	751383	0			FD	0	0.5	2	13		0		10		2		5		7.7	UPPER ANSELMO RECLAI		B	N	N	N	Y	
954	CFUSO88A	RVM-133	01-Jan-90	90S-133/1	DRY	1227350	751383	0			FD	0	0.5	2	0		0		7		1		3		7.5	UPPER ANSELMO RECLAI		B	N	N	N	N	
955	CFUSO88A	RVM-134	01-Jan-90	90S-134	DRY	1227515	751383	0			FD	0	0.5	2	0		0		6		1		2		7.2	UPPER ANSELMO RECLAI		B	N	N	N	Y	
956	CFUSO88A	RVM-135	01-Jan-90	90S-135	DRY	1227715	751321	0			FD	0	0.5	2	0		0		20		1		1		7.6	UPPER ANSELMO RECLAI		B	N	N	N	Y	
957	CFUSO88A	RVM-136	01-Jan-90	90S-136	DRY	1227196	750653	0			FD	0	0.5	2	1		0		16		2		3		6.5	MIDDLE ANSELMO RECLA		B	N	N	N	Y	
958	CFUSO88A	RVM-137	01-Jan-90	90S-137	DRY	1227153	750804	0			FD	0	0.5	2	0		0		9		1		2		6.6	MIDDLE ANSELMO RECLA		B	N	N	N	Y	
959	CFUSO88A	RVM-138	01-Jan-89	89S-036/0	DRY	1227060	750873	0			FD	0	0.5	2	29		0		32		9		13		7.2	MIDDLE ANSELMO RECLA		B	N	N	N	Y	
960	CFUSO88A	RVM-138	01-Jan-90	90S-138/1	DRY	1227060	750873	0			FD	0	0.5	2	0		0		13		1		2		6.8	MIDDLE ANSELMO RECLA		B	N	N	N	N	
961	CFUSO88A	RVM-139	01-Jan-90	90S-139	DRY	1227101	750983	0			FD	0	0.5	2	0		0		18		1		3		7.1	MIDDLE ANSELMO RECLA		B	N	N	N	Y	
962	CFUSO88A	RVM-140	01-Jan-90	90S-140	DRY	1226829	751125	0			FD	0	0.5	2	0		0		21		1		2		7.1	MIDDLE ANSELMO RECLA		B	N	N	N	Y	
963	CFUSO88A	RVM-141	01-Jan-90	90S-141	DRY	1226812	750354	0			FD	0	0.5	2	0		0		9		2		6		7.6	LOWER ANSELMO RECLAI		B	N	N	N	Y	
964	CFUSO88A	RVM-142	01-Jan-89	89S-037	DRY	1226453	750261	0			FD	0	0.5	2	26		0		15		6		28		7.6	LOWER ANSELMO RECLAI		B	N	N	N	Y	
965	CFUSO88A	RVM-142	01-Jan-90	90S-142/1	DRY	1226453	750261	0			FD	0	0.5	2	0		0		11		1		5		7.4	LOWER ANSELMO RECLAI		B	N	N	N	N	
966	CFUSO88A	RVM-143	01-Jan-90	90S-143	DRY	1226332	749947	0			FD	0	0.5	2	0		0		10		2		4		7.4	LOWER ANSELMO RECLAI		B	N	N	N	Y	
967	CFUSO88A	RVM-144	01-Jan-90	90S-144	DRY	1226041	749943	0			FD	0	0.5	2	1		0		12		1		4		7.4	LOWER ANSELMO RECLAI		B	N	N	N	Y	
968	CFUSO88A	RVM-145	01-Jan-90	90S-145	DRY	1225831	749979	0			FD	0	0.5	2	1		0		19		3		16		7.2	LOWER ANSELMO RECLAI		B	N	N	N	Y	
969	CFUSO88A	RVM-146	01-Jan-90	90S-146	DRY	1228750	749899	0			FD	0	0.5	2	0		0		14		3		11		7.6	ORIGINAL SITE RECLAI		B	N	N	N	Y	
970	CFUSO88A	RVM-147	01-Jan-89	89S-038	DRY	1228637	749907	0			FD	0	0.5	2	4		1		80		2		173		7.2	ORIGINAL SITE RECLAI		B	N	N	N	N	
971	CFUSO88A	RVM-147	01-Jan-90	90S-147/1	DRY	1228637	749907	0			FD	0	0.5	2	3		0		13		3		93		7.3	ORIGINAL SITE RECLAI		B	N	N	N	Y	
972	CFUSO88A	RVM-148	01-Jan-90	90S-148	DRY	1228532	749839	0			FD	0	0.5	2	0		0		4		2		2		7.4	ORIGINAL SITE RECLAI		B	N	N	N	Y	
973	CFUSO88A	RVM-149	01-Jan-90	90S-149	DRY	1228411	749884	0			FD	0	0.5	2	0		0		25		46		6		7.5	ORIGINAL SITE RECLAI		B	N	N	N	Y	
974	CFUSO88A	RVM-150	01-Jan-90	90S-150	DRY	1228294	749892	0			FD	0	0.5	2	0		0		9		2		9		7.4	ORIGINAL SITE RECLAI		B	N	N	N	Y	
975	CFUSO88A	RVM-151	01-Jan-90	90S-151	DRY	1228536	749960	0			FD	0	0.5	2	0		0		10		3		8		7.7	ORIGINAL SITE RECLAI		B	N	N	N	Y	
976	CFUSO88A	RVM-152	01-Jan-89	89S-039/0	DRY	1228435	750005	0			FD	0	0.5	2	15		0		6		2		5		7.8	ORIGINAL SITE RECLAI		B	N	N	N	Y	
977	CFUSO88A	RVM-152	01-Jan-90	90S-152	DRY	1228435	750005	0			FD	0	0.5	2	0		0		9		1		5		7	ORIGINAL SITE RECLAI		B	N	N	N	N	
978	CFUSO88A	RVM-153	01-Jan-90	90S-153	DRY	1228217	750025	0			FD	0	0.5	2	1		0		11		80		15		7.7	ORIGINAL SITE RECLAI		B	N	N	N	Y	
979	CFUSO88A	RVM-154	01-Jan-90	90S-154	DRY	1228366	750186	0			FD	0	0.5	2	0		0		4		3		9		7.7	ORIGINAL SITE RECLAI		B	N	N	N	Y	
980	CFUSO88A	RVM-155	01-Jan-90	90S-155	DRY	1228169	750117	0			FD	0	0.5	2	0		0		5		2		7		7.5	ORIGINAL SITE RECLAI		B	N	N	N	Y	
981	CFUSO88A	RVM-156	01-Jan-90	90S-156	DRY	1226651	734247	0			FD	0	0.5	2	0		0		3		1		1		8	TIMBER BUTTE REPOSIT		B	N	N	N	Y	
982	CFUSO88A	RVM-157	01-Jan-90	90S-157	DRY	1228645	734365	0			FD	0	0.5	2	0		0		3		1		2		7.9	TIMBER BUTTE REPOSIT		B	N	N	N	Y	
983	CFUSO88A	RVM-158	01-Jan-90	90S-158	DRY	1228514	734241	0			FD	0	0.5	2	0		0		2		1		1		7.9	TIMBER BUTTE REPOSIT		B	N	N	N	Y	
984	CFUSO88A	RVM-159	01-Jan-90	90S-159/1	DRY	1228501	734378	0			FD	0	0.5	2	0		0		2		1		0		8	TIMBER BUTTE REPOSIT		B	N	N	N	Y	
985	CFUSO88A	RVM-160	01-Jan-90	90S-160	DRY	1228113	734035	0			FD	0	0.5	2	1		0		10		2		3		7.9	MILL SITE RECLAIMED		B	N	N	N	Y	
986	CFUSO88A	RVM-161	01-Jan-90	90S-161	DRY	1227749	733610	0			FD	0	0.5	2	0		0		5		1		2		7.7	MILL SITE RECLAIMED		B	N	N	N	Y	
987	CFUSO88A	RVM-162	01-Jan-90	90S-162	DRY	1227619	733707	0			FD	0	0.5	2	1		0		14		9		15		7.9	MILL SITE RECLAIMED		B	N	N	N	Y	
988	CFUSO88A	RVM-163	01-Jan-90	90S-163	DRY	1227801	733714	0			FD	0	0.5	2	1		0		5		3		6		7.7	MILL SITE RECLAIMED		B	N	N	N	Y	
989	CFUSO88A	RVM-164	01-Jan-90	90S-164/1	DRY	1227599	733825	0			FD	0	0.5	2	2		0		21		7		14		7.4								



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic		Cadmium		Copper		Lead		Zinc		pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
															mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual									
1023	BUTSO93A	93AMY08-0	01-Jul-93	8-37964	DRY	1226482	742704	5454			FD	0	0.17	4	161		6		821		3100		5850		5.38	Anselmo Mine Yard-L		U	N	N	N	N	
1024	BUTSO94A	038WA01-0	10-Nov-94	038-WA-01	DRY	1230079	754929	6306	038-WA-0	038-WA-01-01	FD	0	0.17	4	122		1		56		899		709		3.87	Capitol Hill waste r		Y	Y	N	Y		
1025	BUTSO94A	038WA02-0	09-Nov-94	038-WA-02	DRY	1229704	754091	6226	038-WA-0	038-WA-02-01	FD	0	0.17	4	48		6		461		2730		1860		5.17	Waste material at th		N	Y	N	N		
1026	BUTSO94A	038WA02-0	09-Nov-94	038-WA-02	DRY	1229951	754097	6231	038-WA-0	038-WA-02-02	FD	0	0.17	4	57		11		388		2080		2550		4.85	Waste material at th		N	Y	N	N		
1027	BUTSO94A	038WA02-0	09-Nov-94	038-WA-02	DRY	1230151	754155	6242	038-WA-0	038-WA-02-03	FD	0	0.17	4	24		17		327		4160		4740		4.43	Waste material at th		N	Y	N	Y		
1028	BUTSO94A	038WA02-0	09-Nov-94	038-WA-02	DRY	1230534	754259	6258	038-WA-0	038-WA-02-05	DU	0	0.17	4	145		3		537		496		1050		3.59	Waste material at th		N	Y	N	N		
1029	BUTSO94A	038WA02-0	09-Nov-94	038-WA-02	DRY	1230534	754259	6258	038-WA-0	038-WA-02-04	FD	0	0.17	4	95		3		548		523		918		3.57	Waste material at th		N	Y	N	N		
1030	BUTSO94A	038WA04-0	10-Nov-94	038-WA-04	DRY	1227120	754584	6141	038-WA-0	038-WA-04-01	FD	0	0.17	4	90		20		360		2220		2880		6.39	Waste material north		N	Y	N	Y		
1031	BUTSO94A	038WA05-0	10-Nov-94	038-WA-05	DRY	1227405	753513	6017	038-WA-0	038-WA-05-01	FD	0	0.17	4	34		6		106		1025		1840		6.82	Wappello Dump (#27)		Y	Y	N	Y		
1032	BUTSO94A	038WA06-0	10-Nov-94	038-WA-06	DRY	1227756	752413	6026	038-WA-0	038-WA-06-01	FD	0	0.17	4	49		30		260		2350		8900		4.04	Waste material south		Y	Y	N	Y		
1033	BUTSO94A	038WA06-0	10-Nov-94	038-WA-06	DRY	1227482	752225	6005	038-WA-0	038-WA-06-02	FD	0	0.17	4	404		4		1480		1197		2940		4.05	Waste material south		N	Y	N	N		
1034	BUTSO94A	038WA07-0	10-Nov-94	038-WA-07	DRY	1226676	752000	5995	038-WA-0	038-WA-07-01	FD	0	0.17	4	141		3		1360		1010		1260		2.94	Waste material in Mi		N	Y	N	Y		
1035	BUTSO94A	038WA08-0	10-Nov-94	038-WA-08	DRY	1228209	751560	5966	038-WA-0	038-WA-08-01	FD	0	0.17	4	127		3		1350		643		1420		3.9	Waste material north		Y	Y	N	Y		
1036	BUTSO94A	038WA08-0	10-Nov-94	038-WA-08	DRY	1228386	751136	5925	038-WA-0	038-WA-08-02	FD	0	0.17	4	144		0	U	687		184		436		3.29	Waste material south		Y	Y	N	N		
1037	BUTSO94A	038WA09-0	10-Nov-94	038-WA-09	DRY	1229253	751425	5950	038-WA-0	038-WA-09-01	FD	0	0.17	4	258		37		688		3350		6590		3.61	Waste material along		Y	Y	N	Y		
1038	BUTSO94A	038WA10-0	10-Nov-94	038-WA-10	DRY	1229547	751240	5945	038-WA-1	038-WA-10-01	FD	0	0.17	4	1210		51		1920		835		14500		3.59	Waste material north		Y	Y	N	Y		
1039	BUTSO94A	038WA11-0	10-Nov-94	038-WA-11	DRY	1229867	749957	5808	038-WA-1	038-WA-11-01	FD	0	0.17	4	54		1		733		351		708		3.96	Waste material in va	ACTIVE MINING AREA (	Y	Y	N	Y		
1040	BUTSO94A	038WA12-0	10-Nov-94	038-WA-12	DRY	1229505	749599	5771	038-WA-1	038-WA-12-01	FD	0	0.17	4	69		4		433		1550		1730		3.72	East Soudan-Gold Hill		N	Y	N	Y		
1041	BUTSO94A	038WA14-0	11-Nov-94	038-WA-14	DRY	1228410	748897	5713	038-WA-1	038-WA-14-01	FD	0	0.17	4	88		12		505		1420		3860		3.87	Waste material west		Y	Y	N	Y		
1042	BUTSO94A	038WA15-0	11-Nov-94	038-WA-15	DRY	1228202	748843	5794	038-WA-1	038-WA-15-01	FD	0	0.17	4	168		12		521		1250		5170		4.13	Waste material on ea		Y	Y	N	Y		
1043	BUTSO94A	038WA16-0	11-Nov-94	038-WA-16	DRY	1227667	750056	5834	038-WA-1	038-WA-16-01	FD	0	0.17	4	211		14		417		1140		5010		4.37	Vacant lot west of N		Y	Y	N	N		
1044	BUTSO94A	038WA16-0	11-Nov-94	038-WA-16	DRY	1227583	749988	5829	038-WA-1	038-WA-16-02	FD	0	0.17	4	55		28		588		1190		8560		4.06	Waste dump south of		Y	Y	R	Y	Y	
1045	BUTSO94A	038WA17-0	11-Nov-94	038-WA-17	DRY	1226955	749955	5823	038-WA-1	038-WA-17-01	FD	0	0.17	4	158		7		751		732		2300		4.43	South east side of A		N	Y	N	Y		
1046	BUTSO94A	038WA18-0	11-Nov-94	038-WA-18	DRY	1224309	748956	5729	038-WA-1	038-WA-18-01	FD	0	0.17	4	1090		5		3950		520		2070		3.53	Railroad grade east		Y	Y	N	Y		
1047	BUTSO94A	038WA19-0	11-Nov-94	038-WA-19	DRY	1231510	748130	5591	038-WA-1	038-WA-19-01	FD	0	0.17	4	43		3		430		494		1080		3.59	South of Hoy Hickey		Y	Y	N	N	Y	
1048	BUTSO94A	038WA19-0	11-Nov-94	038-WA-19	DRY	1231720	748146	5590	038-WA-1	038-WA-19-02	FD	0	0.17	4	12		1		416		76		422		4.23	South of Hoy Hickey		N	Y	N	N		
1049	BUTSO94A	038WA20-0	11-Nov-94	038-WA-20	DRY	1231315	747918	5590	038-WA-2	038-WA-20-01	FD	0	0.17	4	350		7		1770		174		2640		4.04	Northwest of ButteN		Y	Y	N	N		
1050	BUTSO94A	038WA20-0	11-Nov-94	038-WA-20	DRY	1231252	747863	5589	038-WA-2	038-WA-20-02	FD	0	0.17	4	101		3		635		507		1120		3.7	West of Butte/New E		Y	Y	R	N	Y	
1051	BUTSO94A	038WA20-0	11-Nov-94	038-WA-20	DRY	1231252	747863	5589	038-WA-2	038-WA-20-03	DU	0	0.17	4	90		3		744		659		1230		3.69	West of Butte/New E		Y	Y	R	Y	Y	
1052	BUTSO94A	038WA22-0	11-Nov-94	038-WA-22	DRY	1230245	745352	5533	038-WA-2	038-WA-22-01	FD	0	0.17	4	350		3		1980		721		1050		2.98	Waste material on so		Y	Y	N	Y		
1053	BUTSO94A	038WA23-0	11-Nov-94	038-WA-23	DRY	1228575	744900	5531	038-WA-2	038-WA-23-01	FD	0	0.17	4	10		0	U	2120		51		240		7.69	Fill material used a		N	Y	N	Y		
1054	BUTSO94A	038WA24-0	14-Nov-94	038-WA-24	DRY	1222471	741503	5529	038-WA-2	038-WA-24-01	FD																						



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic mg/kg	Cadmium mg/kg	Copper mg/kg	Lead mg/kg	Zinc mg/kg	pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
1099	BUTSO94C	13-02	19-Apr-94	038-SA-13	DRY	1225222	744060	0	38SA1302	08-03997	FD	0	0.17	0	110	32	345	4230	1160	5.55	Emma Dump, SE tank o		U	N	Y	N	Y	
1101	BUTSO93B	RRLY020	09-Jun-93	LY0020	DRY	1230736	743572	1686	LY-56	S41489	FD	1.5	1.5	1	165	0	0	356	0			U	N	N	N	Y		
1103	BUTSO93B	RRLY010	07-Jun-93	LY0010	DRY	1231050	743963	1685	LY-23	LY-23	FD	1.5	1.5	1	97	0	920	670	860			U	N	N	N	Y		
1104	BUTSO93B	RRLY011	07-Jun-93	LY0011	DRY	1231065	743898	1685	LY-24	S41476	FD	1.5	1.5	1	394	0	0	567	0			U	N	N	N	Y		
1105	BUTSO93B	RRLY018	09-Jun-93	LY0018	DRY	1231330	743777	1686	LY-47	LY-47	FD	1.5	1.5	1	20	0	110	397	560			U	N	N	N	Y		
1107	BUTSO93B	RRLY015	09-Jun-93	LY0015	DRY	1231638	743956	1685	LY-45	LY-45	FD	1.5	1.5	1	31	0	220	781	1000			U	N	N	N	Y		
1108	BUTSO93B	RRLY016	09-Jun-93	LY0016	DRY	1231562	744065	1685	LY-42	S41482	FD	1.5	1.5	1	173	0	0	622	0			U	N	N	N	Y		
1110	BUTSO93B	RRLY009	07-Jun-93	LY0009	DRY	1231472	744222	1684	LY-20	S41475	FD	1.5	1.5	1	51	0	0	533	0			U	N	N	N	Y		
1111	BUTSO93B	RRLY013	08-Jun-93	LY0013	DRY	1231863	744306	1683	LY-30	S41478	FD	1.5	1.5	1	83	0	0	754	0			U	N	N	N	Y		
1112	BUTSO93B	RRLY012	09-Jun-93	LY0012	DRY	1232066	744491	1682	LY-27	S41477	FD	1.5	1.5	1	652	0	0	934	0			U	N	N	N	Y		
1113	BUTSO93B	RRMLE10	07-Jun-93	MLE010	DRY	1232536	744983	1680	MLE-19	S41451	FD	1.5	1.5	1	186	0	0	425	0			U	N	N	N	Y		
1114	BUTSO93B	RRMLE11	07-Jun-93	MLE011	DRY	1232626	744788	1679	MLE-22	S41452	FD	1.5	1.5	1	601	0	0	788	0			U	N	N	N	Y		
1115	BUTSO93B	RRMLE09	07-Jun-93	MLE009	DRY	1232980	744976	1678	MLE-18	MLE-18	FD	1.5	1.5	1	335	0	610	905	280			U	N	N	N	Y		
1116	BUTSO93B	RRMLE08	07-Jun-93	MLE008	DRY	1233058	745043	1679	MLE-17	MLE-17	FD	1.5	1.5	1	357	0	570	471	300			U	N	N	N	Y		
1127	BUTSO93B	RRMLW09	02-Jun-93	MLW009	DRY	1222730	742292	1670	MLW-17	MLW-17	FD	1.5	1.5	1	583	0	410	298	510			U	N	N	N	Y		
1130	BUTSO93B	RRMLW12	03-Jun-93	MLW012	DRY	1223259	742016	1665	MLW-28	MLW-28	FD	1.5	1.5	1	1153	0	400	434	560			U	N	N	N	Y		
1131	BUTSO93B	RRMLW13	08-Jun-93	MLW013	DRY	1223625	741860	1664	MLW-55	MLW-55	FD	1.5	1.5	1	695	0	780	372	990			U	N	N	N	Y		
1133	BUTSO93B	RRMLW15	03-Jun-93	MLW015	DRY	1224575	741685	1660	MLW-32	MLW-32	FD	1.5	1.5	1	620	0	2100	508	1600			U	N	N	N	Y		
1134	BUTSO93B	RRMLW16	08-Jun-93	MLW016	DRY	1225068	741750	1659	MLW-58	S41418	FD	1.5	1.5	1	187	0	0	50	0			U	N	N	N	Y		
1135	BUTSO93B	RRLY001	07-Jun-93	LY0001	DRY	1228882	742608	1675	LY-1	S41470	FD	1.5	1.5	1	31	0	0	618	0			U	N	N	N	Y		
1136	BUTSO93B	RRLY002	07-Jun-93	LY0002	DRY	1228910	742692	1677	LY-3	S41471	FD	1.5	1.5	1	110	0	0	710	0			U	N	N	N	Y		
1137	BUTSO93B	RRLY003	07-Jun-93	LY0003	DRY	1229046	742706	1677	LY-6	LY-6	FD	1.5	1.5	1	107	0	2800	409	970			U	N	N	N	Y		
1138	BUTSO93B	RRLY008	07-Jun-93	LY0008	DRY	1229788	743154	1686	LY-19	LY-19	FD	1.5	1.5	1	21	0	160	583	1000			U	N	N	N	Y		
1139	BUTSO93B	RRLY007	07-Jun-93	LY0007	DRY	1230201	743593	1686	LY-15	S41474	FD	1.5	1.5	1	179	0	0	2650	0			U	N	N	N	Y		
1140	BUTSO93B	RRLY006	07-Jun-93	LY0006	DRY	1230271	743499	1686	LY-11	S41473	FD	1.5	1.5	1	33	0	0	1160	0			U	N	N	N	Y		
1141	BUTSO93B	RRLY005	07-Jun-93	LY0005	DRY	1230299	743462	1686	LY-10	LY-10	FD	1.5	1.5	1	27	0	160	732	890			U	N	N	N	Y		
1142	BUTSO93B	RRLY004	07-Jun-93	LY0004	DRY	1230324	743421	1686	LY-7	S41472	FD	1.5	1.5	1	621	0	0	611	0			U	N	N	N	Y		
1144	BUTSO93B	RRNB007	04-Jun-93	NB0007	DRY	1227872	740242	1679	NB-14	NB-14	FD	1.5	1.5	1	198	0	720	794	2800			U	N	N	N	Y	Y	
1145	BUTSO93B	RRNB006	04-Jun-93	NB0006	DRY	1226573	740581	1669	NB-13	S41429	FD	1.5	1.5	1	532	0	0	192	0			U	N	N	N	Y		
1147	BUTSO93B	RRNB005	04-Jun-93	NB0005	DRY	1225784	741022	1684	NB-11	S41428	FD	1.5	1.5	1	87	0	0	88	0			U	N	N	N	Y		
1148	BUTSO93B	RRNB004	04-Jun-93	NB0004	DRY	1225889	741246	1662	NB-10	NB-10	FD	1.5	1.5	1	21	0	94	30	120			U	N	N	N	Y		
1152	BUTSO93B	RRNB001	17-Oct-94	NB0001	DRY	1225844	741544	1660	94-015-N	S72807	FD	0	0.1	1	526	0	0	136	0			U	N	N	N	Y		
1153	BUTSO93B	RRNB002	03-Jun-93	NB0002	DRY	1225871	741542	1660	NB-4	S41422	FD	0.42	0.42	1	976	0	0	624	0			U	Y	Y	N	Y		
1155	BUTSO93B	RRMLW17	03-Jun-93	MLW017	DRY	1225557	741792	1659	MLW-34	MLW-34	FD	1.5	1.5	1	434	0	1500	397	2500			U	N	N	N	Y		
1156	BUTSO93B	RRMLW18	02-Jun-93	MLW018	DRY	1226045	741855	1659	MLW-35	S41410	FD	1.5	1.5	1	257	0	0	225	0			U	N	N	N	Y		
1157	BUTSO93B	RRMLW19	03-Jun-93	MLW019	DRY	1226535	741898	1660	MLW-37	MLW-37	FD	1.5	1.5	1	12 U	0	30	11	45			U	N	N	N	Y		
1158	BUTSO93B	RRMLW20	02-Jun-93	MLW020	DRY	1226739	741915	1662	MLW-38	S41411	FD	1.5	1.5	1	11	0	0	13	0			U	N	N	N	Y		
1159	BUTSO93B	RRMLW21	02-Jun-93	MLW021	DRY	1227034	741943	1665	MLW-40	S41412	FD	1.5	1.5	1	3	0	0	9	0			U	N	N	N	Y		
1160	BUTSO93B	RRMLW22	02-Jun-93	MLW022	DRY	1227512	742015	1669	MLW-41	S41415	FD	1.5	1.5	1	9	0	0	21	0			U	N	N	N	Y		
1161	BUTSO93B	RRMLW24	02-Jun-93	MLW024	DRY	1227828	742094	1671	MLW-42	S41416	FD	1.5	1.5	1	20	0	0	74	0			U	N	N	N	Y		
1162	BUTSO93B	RRMLW23	08-Jun-93	MLW023	DRY	1227629	742041	1671	MLW-49	MLW-49	FD	1.5	1.5	1	12 U	0	17	10	36			U	N	N	N	Y		
1163	BUTSO93B	RRMY021	06-Jun-93	MY0021	DRY	1231092	745786	1689	MY-44	MY-44	FD	1.5	1.5	1	93	0	530	1240	1300			U	N	N	N	Y		
1164	BUTSO93B	RRMY020	06-Jun-93	MY0020	DRY	1231153	745788	1689	MY-43	MY-43	FD	1.5	1.5	1	79	0	570	880	2200			U	N	N	N	Y		
1165	BUTSO93B	RRMY019	06-Jun-93	MY0019	DRY	1231233	745828	1689	MY-42	MY-42	FD	1.5	1.5	1	124	0	1200	1160	2100			U	N	N	N	Y		
1166	BUTSO93B	RRMY018	06-Jun-93	MY0018	DRY	1231275	745938	1680	MY-39	S41466	FD	1.5	1.5	1	368	0	0	892	0			U	N	N	N	Y		
1168	BUTSO93B	RRMY016	06-Jun-93	MY0016	DRY	1231586	746049	1690	MY-36	MY-36	FD	1.5	1.5	1	198	0	740	1364	1300			U	N	N	N	Y		
1169	BUTSO93B	RRMY015	06-Jun-93	MY0015	DRY	1231598	746083	1690	MY-35	MY-35	FD	1.5	1.5	1	446	0	1700	806	2700			U	N	N	N	Y		
1170	BUTSO93B	RRMY012	05-Jun-93	MY0012	DRY	1231560	746167	1691	MY-32	MY-32	FD	1.5	1.5	1	27	0	550	924	4600			U	N	N	N	Y		
1173	BUTSO93B	RRMY014	06-Jun-93	MY0014	DRY	1232002	746261	1690	MY-34	MY-34	FD	1.5	1.5	1	471	0	2400	2232	2700 J			U	N	N	N	Y		
1176	BUTSO93B	RRMY025	11-Jun-93	MY0025	DRY	1231797	746482	1692	MY-56	S41468	FD	1.5	1.5	1	845	0	0	551	0			U	N	N	N	Y		
1177	BUTSO93B	RRMY024	11-Jun-93	MY0024	DRY	1231677	746396	1692	MY-55	MY-55	FD	0.58	0.58	1	12 U	0	48	56	1900			U	N	N	N	Y		
1178	BUTSO93B	RRMY022	11-Jun-93	MY0022	DRY	1231328	746223	1692	MY-51	S41467	FD	1.5	1.5	1	215	0	0	675	0			U	N	N	N	Y		
1179	BUTSO93B	RRMY023	11-Jun-93	MY0023	DRY	1231177	746107	1690	MY-54	MY-54	FD	0.33	0.33	1	794	0	350	1004	660			U	Y	Y	N	Y		
1180	BUTSO93B	RRMY013	06-Jun-93	MY0013	DRY	1232750	746687	1690	MY-33	MY-33	FD	1.5	1.5	1	3968	0	9200	1066	630			U	N	N	N	Y		
1181	BUTSO93B	RRMY002	05-Jun-93	MY0002	DRY	1232880	746825	1691	MY-4	S41454	FD	1.5	1.5	1	249	0	0	891	0			U	N	N	N	Y		
1182	BUTSO93B	RRMY001	05-Jun-93	MY0001	DRY	1233493	747235	1693	MY-1	S41453	FD																	



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic		Cadmium		Copper		Lead		Zinc		pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
															mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.									
1207	BUTSO93B	RRMLE04	07-Jun-93	MLE004	DRY	1234145	745625	1682	MLE-8	MLE 8	FD	1.5	1.5	1	285	0		1800	570	5200				U			N	N	N	Y			
1208	BUTSO93B	RRMLE01	07-Jun-93	MLE001	DRY	1234583	745669	1682	MLE-1	MLE 1	FD	1.5	1.5	1	285	0		1800	335	3000				U			N	N	N	Y			
1209	BUTSO93B	RRMLE02	07-Jun-93	MLE002	DRY	1234575	745631	1682	MLE-2	S41447	FD	1.5	1.5	1	243	0	0		387	0				U			N	N	N	Y			
1212	BUTSO93B	RRNB010	04-Jun-93	NB0010	DRY	1229160	738477	1686	NB-22	S41440	FD	1.5	1.5	1	437	0	0		145	0				U			N	N	R	Y	Y		
1214	BUTSO93B	RRNB015	04-Jun-93	NB0015	DRY	1226916	737106	1693	NB-47	NB 47	FD	1.5	1.5	1	12	U	0	28	21	98				U			N	N	N	Y			
1215	BUTSO93B	RRNB014	04-Jun-93	NB0014	DRY	1226966	736955	1695	NB-30	NB 30	FD	1.5	1.5	1	149	0	0	380	50	140				U			N	N	N	Y			
1217	BUTSO93B	RRNB012	10-Jun-93	NB0012	DRY	1227246	736389	1698	NB-54	NB 54	FD	1.5	1.5	1	16	0	0	27	27	100				U			N	N	N	Y			
1335	BUTSO92B	BU-A2-01-	14-Nov-91	BU-A2-01-		1229364	749803	0			FD	0	0.16	2	30	U	5	U	234	268	601			31 E. COPPER		B	Y	Y	R	Y	Y		
1336	BUTSO92B	BU-A2-02-	14-Nov-91	BU-A2-02-		1225346	749701	0			FD	0	0.16	2	40		7		290	363	870			937 W. COPPER		B	Y	Y	R	Y	Y		
1337	BUTSO92B	BU-A2-03-	14-Nov-91	BU-A2-03-		1225375	749692	0			FD	0	0.16	2	53		5	U	322	388	587			935 W. COPPER		B	Y	Y	R	Y	Y		
1338	BUTSO92B	BU-A2-04-	14-Nov-91	BU-A2-04-		1227737	749714	0			FD	0	0.16	2	46		21		257	1820	1340			305 & 305.5 COPPER		B	Y	Y	R	Y	Y		
1339	BUTSO92B	BU-A2-05-	14-Nov-91	BU-A2-05-		1227881	750202	0			FD	0	0.16	2	83		5	U	382	1200	965			208 W. WOOLMAN		B	Y	Y	R	Y	Y		
1340	BUTSO92B	BU-A2-06-	15-Nov-91	BU-A2-06-		1230130	753015	0			FD	0	0.16	2	55		18		399	1710	2430			61 E. CENTER		B	Y	Y	R	Y	Y		
1341	BUTSO92B	BU-A2-07-	15-Nov-91	BU-A2-07-		1229652	752879	0			FD	0	0.16	2	47		6		200	841	763			24 E. CENTER		B	Y	Y	R	Y	Y		
1342	BUTSO92B	BU-A2-08-	15-Nov-91	BU-A2-08-		1232067	745704	0			FD	0	0.16	2	100		13		612	793	1210			1106 E. SECOND ST		B	Y	Y	R	Y	Y		
1343	BUTSO92B	BU-A2-09-	15-Nov-91	BU-A2-09-		1225252	750477	0			FD	0	0.16	2	40		5	U	132	1140	425			LOT W. OF 951 W. ANT		B	Y	Y	R	Y	Y		
1344	BUTSO92B	BU-A2-10-	15-Nov-91	BU-A2-10-		1225283	750528	0			FD	0	0.16	2	97		6		211	4100	560			951 W. ANTIMONY		B	Y	Y	R	Y	Y		
1345	BUTSO92B	BU-A2-11-	15-Nov-91	BU-A2-11-		1227709	749904	0			FD	0	0.16	2	31		8		374	886	1370			454 N. IDAHO		B	Y	Y	R	Y	Y		
1346	BUTSO92B	BU-A2-12-	15-Nov-91	BU-A2-12-		1227708	749875	0			FD	0	0.16	2	53		5		744	1510	1080			452 N. IDAHO		B	Y	Y	R	Y	Y		
1347	BUTSO92B	BU-A2-13-	15-Nov-91	BU-A2-13-		1227854	750271	0			FD	0	0.16	2	61		8		225	956	1240			210 W. WOOLMAN		B	N	Y	R	Y	Y		
1348	BUTSO92B	BU-A2-14-	15-Nov-91	BU-A2-14-		1227624	750581	0			FD	0	0.16	2	183		36		355	2410	5110			330 W. BOARDMAN		B	N	Y	R	Y	Y		
1349	BUTSO92B	BU-A2-15-	15-Nov-91	BU-A2-15-		1227594	750579	0			FD	0	0.16	2	212		35		326	2530	6020			332 W. BOARDMAN		B	N	Y	R	Y	Y		
1350	BUTSO92B	BU-A2-17-	19-Nov-91	BU-A2-17-		1225422	750034	0			FD	0	0.16	2	29	U	5	U	160	707	623			932 W. WOOLMAN		B	Y	Y	R	Y	Y		
1351	BUTSO92B	BU-A2-18-	19-Nov-91	BU-A2-18-		1227571	750569	0			FD	0	0.16	2	218		24		366	9310	4870			336 BOARDMAN		B	N	Y	R	Y	Y		
1352	BUTSO92B	BU-A2-19-	19-Nov-91	BU-A2-19-		1227782	750765	0			FD	0	0.16	2	43		5	U	670	730	895			229 W. BOARDMAN		B	Y	Y	R	Y	Y		
1353	BUTSO92B	BU-A2-20-	19-Nov-91	BU-A2-20-		1223867	744232	0			FD	0	0.16	2	29	U	5	U	134	270	723			307 GRANITE MOUNTAIN		B	Y	Y	R	Y	Y		
1354	BUTSO92B	BU-A2-21-	19-Nov-91	BU-A2-21-		1223957	744308	0			FD	0	0.16	2	77		5	U	317	153	415			507 ORPHAN GIRL		B	Y	Y	R	Y	Y		
1355	BUTSO92B	BU-A2-22-	19-Nov-91	BU-A2-22-		1229803	753199	0			FD	0	0.16	2	29	U	5	U	229	1680	2870			29 E. LAPLATT		B	Y	Y	R	Y	Y		
1356	BUTSO92B	BU-A2-23-	20-Nov-91	BU-A2-23-		1229834	753221	0			FD	0	0.16	2	29	U	5	U	119	690	999			35 E. LAPLATT		B	Y	Y	R	Y	Y		
1357	BUTSO92B	BU-A2-24-	20-Nov-91	BU-A2-24-		1230634	752840	0			FD	0	0.16	2	54		5	U	258	848	947			133 E. CENTER		B	Y	Y	R	Y	Y		
1358	BUTSO92B	BU-A2-25-	20-Nov-91	BU-A2-25-		1228736	754221	0			FD	0	0.16	2	29	U	5	U	97	303	575			618 W. DALY		B	Y	Y	R	Y	Y		
1359	BUTSO92B	BU-A2-26-	20-Nov-91	BU-A2-26-		1229925	755163	0			DU	0	0.16	2	71		5	U	250	811	862			119 E. DALY		B	Y	Y	R	N	Y		
1360	BUTSO92B	BU-A2-26-	20-Nov-91	BU-A2-26-		1229925	755163	0			FD	0	0.16	2	64		5		261	852	892			119 E. DALY		B	Y	Y	R	Y	Y		
1361	BUTSO92B	BU-A2-27-	20-Nov-91	BU-A2-27-		1229967	755209	0			FD	0	0.16	2	59		5		224	1150	822			121 E. DALY		B	Y	Y	R	Y	Y		
1362	BUTSO92B	BU-A2-28-	20-Nov-91	BU-A2-28-		1229145	752388	0			FD	0	0.16	2	51		11		1640	1830	2270			905 N. MAIN		B	Y	Y	R	Y	Y		
1363	BUTSO92B	BU-A2-29-	21-Nov-91	BU-A2-29-		1229151	752448	0			FD	0	0.16	2	58		10		332	2040	1920			921 N. MAIN		B	Y	Y	R				



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measure-ment Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic mg/kg	Qual.	Cadmium mg/kg	Qual.	Copper mg/kg	Qual.	Lead mg/kg	Qual.	Zinc mg/kg	Qual.	pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
1521	BUTSO95A	FSUA-21	27-Oct-95	119713010	DRY	1230001	749421	0			FD	0	0.17	4	68		0		870		740		4760		3.8	East end of Capri Mo		U	Y	Y	N	Y	
1522	BUTSO95A	FSUA-22	27-Oct-95	119714040	DRY	1225149	747873	0			FD	0	0.17	4	197		0		421		350		830		2.59	Corner of Mercury an		U	N	Y	N	Y	
1523	BUTSO95A	FSUA-23	27-Oct-95	119714040	DRY	1225167	747684	0			FD	0	0.17	4	426		0		1230		2630		2010		2.26	Corner of Silver and		U	N	Y	N	Y	
1524	BUTSO95A	FSUA-24	16-Nov-95	119712041	DRY	1228354	751185	0			DU	0	0.17	4	127		0		584		438		1310		3.62	South of Ruby (42218		U	Y	Y	N	Y	
1525	BUTSO95A	FSUA-24	16-Nov-95	119712041	DRY	1228354	751185	0			FD	0	0.17	4	123		0		593		407		1290		3.63	South of Ruby (42218		U	Y	Y	N	N	
1526	BUTSO95A	FSUA-26	16-Nov-95	119713010	DRY	1230957	749228	0			FD	0	0.17	4	312		0		1270		3560		1460		2.37	corner of Granite &		U	N	Y	N	Y	
1527	BUTSO95A	FSUA-27	16-Nov-95	119713010	DRY	1230813	749214	0			FD	0	0.17	4	262		0		1130		1130		409		2.08	South of Granite (12		U	Y	Y	N	Y	
1528	BUTSO95A	FSUA-28	16-Nov-95	119713010	DRY	1230762	749043	0			FD	0	0.17	4	211		0		934		2520		1050		2.81	East of 231 East Bro		U	N	Y	R	Y	Y
1529	BUTSO95A	FSUA-29	16-Nov-95	119713010	DRY	1230624	749215	0			FD	0	0.17	4	142		0		664		391		927		2.96	326 & 308 East Grani		U	Y	Y	N	Y	
1530	BUTSO95A	FSUA-30	17-Nov-95	119713010	DRY	1228926	749319	0			FD	0	0.17	4	130		0		593		2230		2680		3.02	West of 221 Quartz (		U	N	Y	N	N	
1531	BUTSO95A	FSUA-30	17-Nov-95	119713010	DRY	1228926	749319	0			DU	0	0.17	4	119		0		571		2300		2540		3.08	West of 221 Quartz (		U	N	Y	N	Y	
1532	BUTSO95A	FSUA-32	17-Nov-95	119713011	DRY	1230888	748926	0			FD	0	0.17	4	26		0		1510		135		942		4.78	South of Broadway (1		U	Y	Y	N	Y	
1533	BUTSO95A	FSUA-33	17-Nov-95	119713011	DRY	1230645	748924	0			FD	0	0.17	4	85		0		564		167		1510		3.78	South of Broadway (1		U	Y	Y	N	Y	
1534	BUTSO95A	FSUA-34	17-Nov-95	119713011	DRY	1230843	748763	0			FD	0	0.17	4	60		0		2040		174		1770		3.67	corner of Park & Cou		U	Y	Y	N	Y	
1535	BUTSO95A	FSUA-35	17-Nov-95	119713011	DRY	1229391	748099	0			FD	0	0.17	4	769		0		2280		1710		5860		3.3	back of Royal Garage		U	Y	Y	N	Y	
1536	BUTSO95A	FSUA-36	17-Nov-95	119713011	DRY	1230423	748465	0			FD	0	0.17	4	61		0		723		457		1000		2.91	building to West of		U	Y	Y	N	Y	
1537	BUTSO95A	FSUA-37	20-Nov-95	119713030	DRY	1227834	747729	0			FD	0	0.17	4	26		0		142		2410		1630		7.45	Northeast of Idaho-S		U	Y	Y	N	Y	
1538	BUTSO95A	FSUA-38	20-Nov-95	119713030	DRY	1227904	747647	0			DU	0	0.17	4	25		0		136		2310		1590		7.34	Northeast of Idaho-S		U	N	Y	N	Y	
1539	BUTSO95A	FSUA-39	20-Nov-95	119714040	DRY	1225208	747242	0			FD	0	0.17	4	112		0		234		2460		1910		3.26	Southwest corner of		U	N	Y	N	Y	
1540	BUTSO95A	FSUA-40	20-Nov-95	119714040	DRY	1222657	745399	0			FD	0	0.17	4	457		0		62		1490		1830		7.26	*Source Area #118, 1		U	Y	Y	N	Y	
1541	BUTSO95A	FSUA-41	20-Nov-95	119818020	DRY	1231511	748371	0			FD	0	0.17	4	113		0		1320		1620		2710		3.33	417 East Galena (215		U	Y	Y	N	Y	
1542	BUTSO95A	FSUA-42	20-Nov-95	119818020	DRY	1231554	747945	0			FD	0	0.17	4	262		0		745		4350		1830		2.01	East side of 344 Eas		U	N	Y	N	Y	
1543	BUTSO95A	FSUA-43	20-Nov-95	119818020	DRY	1231428	747933	0			FD	0	0.17	4	32		0		762		274		622		4.3	West of 340 East Mer		U	N	Y	N	Y	
1544	BUTSO95A	FSUA-44	21-Nov-95	119818020	DRY	1232166	748406	0			FD	0	0.17	4	33		0		836		174		575		3.82	corner of Continental		U	Y	Y	N	Y	
1545	BUTSO95A	FSUA-45	21-Nov-95	119818030	DRY	1231022	747686	0			FD	0	0.17	4	103		0		446		2600		4410		2.23	East end of Curtis S		U	Y	Y	N	N	
1546	BUTSO95A	FSUA-45	21-Nov-95	119818030	DRY	1231022	747686	0			DU	0	0.17	4	107		0		434		2750		4390		2.2	East end of Curtis S		U	Y	Y	N	Y	
1547	BUTSO95A	FSUA-47	21-Nov-95	119723010	DRY	1225388	745744	0			FD	0	0.17	4	398		0		2250		930		4630		3.78	SE of West Junior Hi		U	Y	Y	N	Y	
1548	BUTSO95A	FSUA-48	21-Nov-95	119819030	DRY	1231640	742456	0			FD	0	0.17	4	84		0		665		2030		4430		6.37	*South side of Georg		U	Y	Y	N	Y	
1549	BUTSO95A	FSUA-49	21-Nov-95	119723010	DRY	1223719	745259	0			FD	0	0.17	4	117		0		52		251		563		6.31	*North side of Iron		U	N	Y	N	Y	
1550	BUTSO95A	FSUA-50	21-Nov-95	119723010	DRY	1223578	745311	0			FD	0	0.17	4	126		0		97		671		628		4.88	*North side of Iron		U	N	Y	N	Y	
1551	BUTSO95A	FSUA-51	21-Nov-95	119723010	DRY	1223231	745340	0			FD	0	0.17	4	149		0		114		380		576		6.42	*North side of Iron		U	N	Y	N	Y	
1552	BUTSO95A	FSUA-52	11-Dec-95	11981803R	DRY	1231745	746485	0			FD	0	0.17	4	322		0		2060		1070		4640		6.18	Middle RR Yard		U	Y	Y	N	Y	
1553	BUTSO95A	FSUA-53	11-Dec-95	11972401R	DRY	1230882	743835	0			FD	0	0.17	4	137		0		2500		1030		4350		5.92	Lower RR Yard		U	Y	Y	N	Y	
1554	BUTSO95A	FSUA-54	12-Dec-95	11981803R	DRY	1231846	746417	0			FD	0	0.17	4	528		0		6290		1440		12300		5.38	Middle RR Yard		U	Y	Y	N	Y	
1555	BUTSO95A	FSUA-55	12-Dec-95	11981902R	DRY	1231630	744229	0			FD	0	0.17	4	605		0		52700		2060		7650		6.56	Lower RR Yard		U	Y	Y	N	Y	
1556	BUTSO95A	FSUA-56	11-Dec-95	11981902R	DRY	1231493	743814	0			FD	0	0.17	4	143		0		772		2860		1960		2.79	Lower RR Yard		U	Y	Y	N	Y	
1557	BUTSO95A	FSUA-57	11-Dec-95	11972401R	DRY	1230290	743382	0			FD	0	0.17	4	228		0		12600		1190		6250		7.2	Lower RR Yard		U	Y	Y	N	Y	
1558	BUTSO95A	FSUA-58	12-Dec-95	11981902R	DRY	1231708	744152	0			FD	0	0.17	4	257		0		12100		2030		6880		6.69	Lower RR Yard		U	Y	Y	N	Y	
1559	BUTSO95A	FSUA-59	11-Dec-95	11972401R	DRY	1230018	745341	0			FD	0	0.17	4	121		0		2370		533		1870		6.62	Lower RR Yard		U	Y	Y	N	Y	
1560	BUTSO95A	FSUA-60	11-Dec-95	11981902R	DRY	1231471	743736	0			FD	0	0.17	4	211		0		3230		3150		1820		7.57	Lower RR Yard		U	Y	Y	N	Y	
1561	BUTSO95A	FSUA-61	14-Dec-95	11971401R	DRY	1224380	748293	0			FD	0	0.17	4	523		0		850		1360		1240		2.55	*Quartz & Granite, N		U	Y	Y	N	Y	
1562	BUTSO95A	FSUA-62	13-Dec-95	11972303R	DRY	1221964	742643	0			FD	0	0.17	4	128		0		149		1560		1990		2.36			U	Y	Y	N	Y	
1563	BUTSO95A	FSUA-63	13-Dec-95	11972303R	DRY	1223446	741919	0			FD	0	0.17	4	233		0		298		220		642		4.1	tailings		U	Y	Y	N	Y	
1564	BUTSO95A	FSUA-64	14-Dec-95	11971204R	DRY	1229897	750942	0			FD	0	0.17	4	523		0		6010		626		2740		3.95	Mina & Cleargrit		U	N	Y	N	Y	
1565	BUTSO95A	FSUA-65	14-Dec-95	11971204R	DRY	1228663	750670	0			FD	0	0.17	4	696		0		2320		1840		4050		3.06	Sutler & Pearl		U	Y	Y	N	Y	
1566	BUTSO95A	FSUA-66	14-Dec-95	11971204R	DRY	1229392	751286	0			FD	0	0.17	4	94		0		687		361		1170		3.96	Mina & Cleargrit		U	N	Y	N	Y	
1567	BUTSO95A	FSUA-67	13-Dec-95	11972404R	DRY	1229030	742681	0			FD	0	0.17	4	190		0		3910		219		460		3.08	waste rock		U	Y	Y	N	Y	
1568	BUTSO95A	FSUA-68	13-Dec-95	11972403R	DRY	1227059	741970	0			FD	0	0.17	4	1560		0		163		148		238		5.47			U	N	Y	N	Y	
1569	BUTSO95A	FSUA-69	13-Dec-95	11972404R	DRY	1228183	742759	0			FD	0	0.17	4	259		0		5320		267		766		3.69	waste rock							



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic		Cadmium		Copper		Lead		Zinc		pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
															mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.									
1596	BUTSO95A	FSUA-96	13-Dec-95	11972403R	DRY	1227026	741887	0			FD	0	0.17	4	165	0		924	185		511	3.36			U	N	Y	N	Y				
1597	BUTSO95A	FSUA-97	12-Dec-95	11981803R	DRY	1232804	747632	0			FD	0	0.17	4	206	0		784	193		423	2.52	along bank of expose		U	N	Y	N	Y				
1598	BUTSO95A	FSUA-98	12-Dec-95	11981803R	DRY	1231817	746111	0			FD	0	0.17	4	739	0		12700	3690		11600	5.11			U	Y	Y	N	Y				
1599	BUTSO95A	FSUA-99	12-Dec-95	11971304R	DRY	1230115	745288	0			FD	0	0.17	4	591	0		3670	1540		5250	6.26			U	Y	Y	N	Y				
1600	BUTSO95A	FSUA-100	14-Dec-95	11981804R	DRY	1233551	745521	0			FD	0	0.17	4	726	0		12200	1200		2630	4.91	MWRR Main Line East		U	Y	Y	N	Y				
1601	BUTSO95A	FSUA-101	12-Dec-95	11981803R	DRY	1232052	747119	0			FD	0	0.17	4	4530	0		9200	3480		4760	4.16			U	Y	Y	N	Y				
1602	BUTSO95A	FSUA-102	12-Dec-95	11981803R	DRY	1231822	747224	0			FD	0	0.17	4	243	0		2120	942		3210	5.07			U	Y	Y	N	Y				
1603	BUTSO95A	FSUA-103	14-Dec-95	11972504R	DRY	1228650	734960	0			FD	0	0.17	4	319	0		166	857		971	3.6	base of Timber Butte		U	Y	Y	N	Y				
1604	BUTSO95A	FSUA-104	14-Dec-95	11972503R	DRY	1227486	735932	0			FD	0	0.17	4	404	0		203	914		2000	4.53	North of Timber Butt		U	Y	Y	N	Y				
1605	BUTSO95A	FSUA-105	14-Dec-95	11972502R	DRY	1226409	737925	0			FD	0	0.17	4	164	0		207	324		881	6	along abandoned RR g		U	Y	Y	N	Y				
1606	BUTSO95A	FSUA-106	14-Dec-95	11981901R	DRY	1235100	744960	0			FD	0	0.17	4	187	0		684	380		559	6.19	Texas & Continental		U	Y	Y	N	Y				
1607	BUTSO95A	FSUA-107	14-Dec-95	11981804R	DRY	1235638	745285	0			FD	0	0.17	4	73	0		355	210		430	3.03	between Continental	OUTSIDE OPERABLE UNI	U	Y	Y	N	Y				
1608	BUTSO95A	FSUA-108	19-Jun-96	119712041	DRY	1230103	750823	0			FD	0	0.17	4	136	0		615	794		966	2.46			U	N	Y	N	Y				
1609	BUTSO95A	FSUA-109	20-Jun-96	119712041	DRY	1227952	751690	0			FD	0	0.17	4	380	0		2220	1600		5600	4.97			U	Y	Y	N	Y				
1610	BUTSO95A	FSUA-110	20-Jun-96	119712041	DRY	1227859	750776	0			FD	0	0.17	4	137	0		811	2950		1810	3.77			U	N	Y	N	Y				
1611	BUTSO95A	FSUA-111	20-Jun-96	119713020	DRY	1227977	749619	0			FD	0	0.17	4	69	0		317	1370		2550	4.36			U	Y	Y	N	Y				
1612	BUTSO95A	FSUA-112	19-Jun-96	119713011	DRY	1228272	749810	0			FD	0	0.17	4	392	0		1670	2050		6630	5.66			U	N	Y	N	Y				
1613	BUTSO95A	FSUA-113	19-Jun-96	119807030	DRY	1231280	751757	0			FD	0	0.17	4	609	0		2010	417		486	1.97			U	Y	Y	N	Y				
1614	BUTSO95A	FSUA-114	19-Jun-96	119807030	DRY	1231288	752178	0			FD	0	0.17	4	336	0		894	1620		911	2.39			U	Y	Y	N	Y				
1615	BUTSO95A	FSUA-115	19-Jun-96	119807030	DRY	1231651	752365	0			FD	0	0.17	4	407	0		965	3350		1010	2.21			U	Y	Y	N	Y				
1617	BUTSO95A	FSUA-117	21-Jun-96	119712020	DRY	1226962	755490	0			FD	0	0.17	4	27	0		217	2680		2680	3.42			U	Y	Y	N	Y				
1618	BUTSO95A	FSUA-118	20-Jun-96	119712020	DRY	1225569	753548	0			FD	0	0.17	4	69	0		386	446		1680	3.17			U	Y	Y	N	Y				
1619	BUTSO95A	FSUA-119	20-Jun-96	119712020	DRY	1226667	754679	0			DU	0	0.17	4	90	0		170	1250		1300	6.04			U	N	Y	N	Y				
1620	BUTSO95A	FSUA-119	20-Jun-96	119712020	DRY	1226667	754679	0			DU	0	0.17	4	85	0		180	1130		1160	6.16			U	N	Y	N	Y				
1621	BUTSO95A	FSUA-121	20-Jun-96	119713030	DRY	1227816	745377	0			FD	0	0.17	4	77	0		118	465		379	8.21			U	Y	Y	N	Y				
1622	BUTSO95A	FSUA-122	20-Jun-96	119713011	DRY	1228767	750560	0			FD	0	0.17	4	301	0		902	2860		2740	4.44			U	Y	Y	N	Y				
1623	BUTSO95A	FSUA-123	20-Jun-96	119713040	DRY	1229832	745811	0			FD	0	0.17	4	156	0		852	2860		5800	3.08			U	Y	Y	N	Y				
1624	BUTSO95A	FSUA-124	21-Jun-96	119713040	DRY	1230905	747096	0			FD	0	0.17	4	84	0		841	2280		4810	2.46			U	Y	Y	N	Y				
1625	BUTSO95A	FSUA-125	21-Jun-96	119714030	DRY	1222764	746885	0			FD	0	0.17	4	207	0		68	3560		6870	4.76			U	N	Y	N	Y				
1626	BUTSO95A	FSUA-126	20-Jun-96	119819010	DRY	1233696	744772	0			FD	0	0.17	4	59	0		745	137		416	6.29			U	Y	Y	N	Y				
1627	BUTSO95A	FSUA-127	20-Jun-96	119819010	DRY	1233994	744726	0			FD	0	0.17	4	598	0		362	612		1310	5.4			U	Y	Y	N	Y				
1628	BUTSO95A	FSUA-128	20-Jun-96	119819020	DRY	1230925	743358	0			FD	0	0.17	4	21	0		121	286		651	7.89			U	Y	Y	N	Y				
1629	BUTSO95A	FSUA-129	20-Jun-96	119819020	DRY	1231683	742709	0			FD	0	0.17	4	396	0		2380	602		2010	4.63			U	Y	Y	N	Y				
1630	BUTSO95A	FSUA-130	20-Jun-96	119819020	DRY	1232305	743306	0			FD	0	0.17	4	232	0		1520	335		5130	4.4			U	Y	Y	N	Y				
1631	BUTSO95A	FSUA-131	21-Jun-96	119723010	DRY	1224422	743523	0			FD	0	0.17	4	234	0		41	115		103	3.58			U	Y	Y	N	Y				
1632	BUTSO95A	FSUA-132	21-Jun-96	119723020	DRY	1222048	743960	0			FD	0	0.17	4	155	0		78	626		1000	6.5			U	Y	Y	N	Y				
1633	BUTSO95A	FSUA-133	21-Jun-96	119724020	DRY																												



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measure-ment Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic mg/kg Qual.	Cadmium mg/kg Qual.	Copper mg/kg Qual.	Lead mg/kg Qual.	Zinc mg/kg Qual.	pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
1106a	BUTSO93B	RRLY017	09-Jun-93	LY0017	DRY	1231512	743844	1686	LY-46	LY-46	FD	0.58	0.58	1	81	0	730	3844	1200			U	N	N	N	Y		
1106b	BUTSO93B	RRLY017	09-Jun-93	LY0017	DRY	1231512	743844	1686	LY-38	S41479	FD	1.5	1.5	1	29	0	0	803	0			U	N	N	N	N		
1106c	BUTSO93B	RRLY017	09-Jun-93	LY0017	DRY	1231512	743844	1686	LY-38	E41526	FD	1.5	1.5	1	0 U	0	0	0	1			U	N	N	N	N		
1106a	BUTSO93B	RRLY014	09-Jun-93	LY0014	DRY	1231694	744216	1684	LY-33	LY-33	FD	0.08	0.08	1	744	0	18400	4712	7800			U	Y	Y	N	Y		
1106b	BUTSO93B	RRLY014	09-Jun-93	LY0014	DRY	1231694	744216	1684	LY-34	LY-34	FD	0.5	0.5	1	558	0	2300	818	1500			U	Y	Y	N	N		
1106c	BUTSO93B	RRLY014	09-Jun-93	LY0014	DRY	1231694	744216	1684	LY-35	LY-35	FD	1	1	1	422	0	2700	533	570			U	N	N	N	N		
1106d	BUTSO93B	RRLY014	09-Jun-93	LY0014	DRY	1231694	744216	1684	LY-36	LY-36	FD	1.5	1.5	1	22	0	500	682	820			U	N	N	N	N		
1106e	BUTSO93B	RRLY014	09-Jun-93	LY0014	DRY	1231694	744216	1684	LY-37	LY-37	FD	2	2	1	53	0	520	930	1500			U	N	N	N	N		
1126a	BUTSO93B	RRMLW08	02-Jun-93	MLW008	DRY	1222292	742519	1675	MLW-12	S41399	FD	0.08	0.08	1	97	0	0	151	0			U	Y	Y	N	Y		
1126b	BUTSO93B	RRMLW08	02-Jun-93	MLW008	DRY	1222292	742519	1675	MLW-13	S41400	FD	0.5	0.5	1	165	0	0	149	0			U	Y	Y	N	N		
1126c	BUTSO93B	RRMLW08	02-Jun-93	MLW008	DRY	1222292	742519	1675	MLW-14	S41401	FD	1	1	1	191	0	0	144	0			U	N	N	N	N		
1126d	BUTSO93B	RRMLW08	02-Jun-93	MLW008	DRY	1222292	742519	1675	MLW-15	S41402	FD	1.5	1.5	1	158	0	0	119	0			U	N	N	N	N		
1126e	BUTSO93B	RRMLW08	02-Jun-93	MLW008	DRY	1222292	742519	1675	MLW-16	S41403	FD	2	2	1	139	0	0	116	0			U	N	N	N	N		
1128a	BUTSO93B	RRMLW10	08-Jun-93	MLW010	DRY	1222926	742237	1667	MLW-51	S41417	FD	1.5	1.5	1	494	0	0	300	0			U	N	N	N	Y		
1128b	BUTSO93B	RRMLW10	08-Jun-93	MLW010	DRY	1222926	742237	1667	MLW-51	E41519	FD	1.5	1.5	1	1	0	0	0	1			U	N	N	N	N		
1129a	BUTSO93B	RRMLW11	02-Jun-93	MLW011	DRY	1222905	742200	1668	MLW-20	S41404	FD	0.17	0.17	1	333	0	0	314	0			U	Y	Y	N	Y		
1129b	BUTSO93B	RRMLW11	02-Jun-93	MLW011	DRY	1222905	742200	1668	MLW-21	S41405	FD	0.5	0.5	1	4	0	0	243	0			U	Y	Y	N	N		
1129c	BUTSO93B	RRMLW11	02-Jun-93	MLW011	DRY	1222905	742200	1668	MLW-22	S41406	FD	1	1	1	545	0	0	278	0			U	N	N	N	N		
1129d	BUTSO93B	RRMLW11	02-Jun-93	MLW011	DRY	1222905	742200	1668	MLW-23	S41407	FD	1.5	1.5	1	360	0	0	195	0			U	N	N	N	N		
1129e	BUTSO93B	RRMLW11	02-Jun-93	MLW011	DRY	1222905	742200	1668	MLW-24	S41408	FD	2	2	1	435	0	0	215	0			U	N	N	N	N		
1129f	BUTSO93B	RRMLW11	02-Jun-93	MLW011	DRY	1222905	742200	1668	MLW-72	S41419	DU	2	2	1	356	0	0	170	0			U	N	N	N	N		
1132a	BUTSO93B	RRMLW14	02-Jun-93	MLW014	DRY	1224088	741701	1661	MLW-30	S41409	FD	1.5	1.5	1	943	0	0	389	0			U	N	N	N	N		
1132b	BUTSO93B	RRMLW14	02-Jun-93	MLW014	DRY	1224088	741701	1661	MLW-30	E41518	DU	1.5	1.5	1	0	0	0	0	2			U	N	N	N	N		
1132c	BUTSO93B	RRMLW14	02-Jun-93	MLW014	DRY	1224088	741701	1661	MLW-73	S41419	DU	1.5	1.5	1	731	0	0	283	0			U	N	N	N	N		
1143a	BUTSO93B	RRNB008	04-Jun-93	NB0008	DRY	1226278	739931	1681	NB-15	E41521	FD	1.5	1.5	1	0	0	0	0 U	1			U	N	N	R	N	Y	
1143b	BUTSO93B	RRNB008	04-Jun-93	NB0008	DRY	1226278	739931	1681	NB-15	S41430	FD	1.5	1.5	1	76	0	0	61	0			U	N	N	R	Y	Y	
1146a	BUTSO94D	RRNB016	17-Oct-94	NB0016	DRY	1226353	740645	1668	94-012-N	S72804	FD	0	0.2	1	163	0	0	220	0			U	N	N	N	N		
1146b	BUTSO94D	RRNB016	17-Oct-94	NB0016	DRY	1226353	740645	1668	94-013-N	S72805	FD	1	1.3	1	514	0	0	346	0			U	N	N	N	N	Y	
1146c	BUTSO94D	RRNB016	17-Oct-94	NB0016	DRY	1226353	740645	1668	94-014-N	S72806	FD	2.2	2.5	1	209	0	0	6	0			U	N	N	N	N		
1149a	BUTSO94D	RRNB017	17-Oct-94	NB0017	DRY	1225639	741278	1662	94-009-N	S72801	FD	0	0.2	1	310	0	0	226	0			U	N	N	N	N		
1149b	BUTSO94D	RRNB017	17-Oct-94	NB0017	DRY	1225639	741278	1662	94-010-N	S72802	FD	0.8	1	1	360	0	0	798	0			U	N	N	N	N	Y	
1149c	BUTSO94D	RRNB017	17-Oct-94	NB0017	DRY	1225639	741278	1662	94-011-N	S72803	FD	2.5	2.5	1	212	0	0	8	0			U	N	N	N	N		
1151a	BUTSO94D	RRNB016	17-Oct-94	NB0016	DRY	1225628	741524	1660	94-006-N	S72798	FD	0	0.2	1	340	0	0	131	0			U	N	N	N	N		
1151b	BUTSO94D	RRNB016	17-Oct-94	NB0016	DRY	1225628	741524	1660	94-007-N	S72799	FD	1	1.5	1	485	0	0	351	0			U	N	N	N	N	Y	
1151c	BUTSO94D	RRNB016	17-Oct-94	NB0016	DRY	1225628	741524	1660	94-008-N	S72800	FD	2.8	2.8	1	346	0	0	13	0			U	N	N	N	N		
1152a	BUTSO93B	RRNB001	03-Jun-93	NB0001	DRY	1225644	741544	1660	NB-1	E41520	FD	1.5	1.5	1	0 U	0	6	0 U	2			U	N	N	N	N		
1152b	BUTSO93B	RRNB001	03-Jun-93	NB0001	DRY	1225644	741544	1660	NB-1	S41421	FD	1.5	1.5	1	13	0	0	15	0			U	N	N	N	N		
1154a	BUTSO93B	RRNB003	03-Jun-93	NB0003	DRY	1225713	741539	1660	NB-5	S41423	FD	0.08	0.08	1	72	0	0	210	0			U	Y	Y	N	N		
1154b	BUTSO93B	RRNB003	03-Jun-93	NB0003	DRY	1225713	741539	1660	NB-6	S41424	FD	0.5	0.5	1	118	0	0	609	0			U	Y	Y	N	N	Y	
1154c	BUTSO93B	RRNB003	03-Jun-93	NB0003	DRY	1225713	741539	1660	NB-7	S41425	FD	1	1	1	76	0	0	88	0			U	N	N	N	N		
1154d	BUTSO93B	RRNB003	03-Jun-93	NB0003	DRY	1225713	741539	1660	NB-8	S41426	FD	1.5	1.5	1	146	0	0	121	0			U	N	N	N	N		
1154e	BUTSO93B	RRNB003	03-Jun-93	NB0003	DRY	1225713	741539	1660	NB-9	S41427	FD	2	2	1	419	0	0	271	0			U	N	N	N	N		
1167a	BUTSO93B	RRMY017	06-Jun-93	MY0017	DRY	1231301	745887	1689	MY-37	S41465	FD	1.5	1.5	1	448	0	0	592	0			U	N	N	N	N	Y	
1167b	BUTSO93B	RRMY017	06-Jun-93	MY0017	DRY	1231301	745887	1689	MY-37	E41525	FD	1.5	1.5	1	0 U	0	4	0 U	2			U	N	N	N	N		
1171a	BUTSO93B	RRMY011	05-Jun-93	MY0011	DRY	1231804	746232	1691	MY-27	MY-27	FD	0.08	0.08	1	1364	0	7700	4216	15300			U	Y	Y	N	Y		
1171b	BUTSO93B	RRMY011	05-Jun-93	MY0011	DRY	1231804	746232	1691	MY-28	MY-28	FD	0.5	0.5	1	670	0	1300	2232	3200			U	Y	Y	N	N		
1171c	BUTSO93B	RRMY011	05-Jun-93	MY0011	DRY	1231804	746232	1691	MY-29	MY-29	FD	1	1	1	347	0	1400	1488	2500			U	N	N	N	N		
1171d	BUTSO93B	RRMY011	05-Jun-93	MY0011	DRY	1231804	746232	1691	MY-30	MY-30	FD	1.5	1.5	1	769	0	2500	694	2700			U	N	N	N	N		
1171e	BUTSO93B	RRMY011	05-Jun-93	MY0011	DRY	1231804	746232	1691	MY-31	MY-31	FD	2	2	1	1166	0	1400	1364	2500			U	N	N	N	N		
1172a	BUTSO93B	RRMY010	05-Jun-93	MY0010	DRY	1231826	746207	1691	MY-26	S41532	FD	0.08	0.08	1	2400	83	198000	24500	22200			U	Y	Y	N	Y		
1172b	BUTSO93B	RRMY010	05-Jun-93	MY0010	DRY	1231826	746207	1691	MY-26	E41524	FD	0.08	0.08	1	0 U	0	193	0	89			U	N	N	N	N		
1174a	BUTSO93B	RRMY009	05-Jun-93	MY0009	DRY	1232179	746468	1691	MY-21	S41460	FD	0.08	0.08	1	550	0	0	2940	0			U	Y	Y	N	Y		
1174b	BUTSO93B	RRMY009	05-Jun-93	MY0009	DRY	1232179	746468	1691	MY-22	S41461	FD	0.5	0.5	1	2710	0	0	2200	0			U	Y	Y	N	N		
1174c	BUTSO93B	RRMY009	05-Jun-93	MY0009	DRY	1232179	746468	1691	MY-23	S41462	FD	1	1	1	1180	0	0	1320	0			U	N	N	N	N		
1174d	BUTSO93B	RRMY009	05-Jun-93	MY0009	DRY	1232179	746468	1691	MY-24	S41463	FD	1.5	1.5	1	1340	0	0	859	0			U	N	N	N	N		
1174e	BUTSO93B	RRMY009	05-Jun-93	MY0009	DRY	1232179	746468	1691	MY-25	S41464	FD	2	2	1	1210													



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic		Cadmium		Copper		Lead		Zinc		pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
															mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.									
1211d	BUTSO93B	RRNB009	04-Jun-93	NB0009	DRY	1229087	738592	1685	NB-20	S41438	FD	1.5	1.5	1	17	J	0		0		23	J	0			U	N	N	R	N	Y		
1211e	BUTSO93B	RRNB009	04-Jun-93	NB0009	DRY	1229087	738592	1685	NB-21	S41439	FD	2	2	1	18		0		0		19		0			U	N	N	R	N	Y		
1216a	BUTSO93B	RRNB013	04-Jun-93	NB0013	DRY	1227061	736689	1696	NB-25	S41442	FD	0.08	0.08	1	208		0		0		462		0			U	Y	Y	R	N	Y		
1216b	BUTSO93B	RRNB013	04-Jun-93	NB0013	DRY	1227061	736689	1696	NB-26	S41443	FD	0.5	0.5	1	77		0		0		168		0			U	Y	Y	R	N	Y		
1216c	BUTSO93B	RRNB013	04-Jun-93	NB0013	DRY	1227061	736689	1696	NB-27	S41444	FD	1	1	1	14		0		0		23		0			U	N	N	R	N	Y		
1216d	BUTSO93B	RRNB013	04-Jun-93	NB0013	DRY	1227061	736689	1696	NB-28	S41445	FD	1.5	1.5	1	8		0		0		15		0			U	N	N	R	N	Y		
1216e	BUTSO93B	RRNB013	04-Jun-93	NB0013	DRY	1227061	736689	1696	NB-29	S41446	FD	2	2	1	26		0		0		51		0			U	N	N	R	N	Y		
1218a	BUTSO93B	RRNB011	04-Jun-93	NB0011	DRY	1227620	736314	1699	NB-23	E41522	FD	1.5	1.5	1	0	U	0		0		0	U	0			U	N	N	R	N	Y		
1218b	BUTSO93B	RRNB011	04-Jun-93	NB0011	DRY	1227620	736314	1699	NB-23	S41441	FD	1.5	1.5	1	47		0		0		71		0			U	Y	Y	R	N	Y		
1384	BUTSO91D	BU-3	06-Dec-89	BU-3-5-1		1228637	756304	0			FD	0	0.17	2	25		0		86		262		374	J		B	Y	Y	R	Y	Y		
1385	BUTSO91D	BU-4	27-Nov-89	BU-4-3-1		1230008	755268	0			FD	0	0.17	2	54	J	0		148	J	904		593			B	Y	Y	R	N	Y		
1387	BUTSO91D	BU-4	22-Nov-89	BU-4-17-1		1230642	754556	0			FD	0	0.17	2	103		0		259	J	1720		2680			B	Y	Y	R	N	Y		
1388	BUTSO91D	BU-4	21-Nov-89	BU-4-20-1		1230242	755536	0			FD	0	0.17	2	77		0		302		1110		1680	J		B	Y	Y	R	N	Y		
1389	BUTSO91D	BU-4	29-Nov-89	BU-4-22-1		1229038	754002	0			FD	0	0.17	2	39		0		266		840		1580	J		B	Y	Y	R	N	Y		
1390	BUTSO91D	BU-4	27-Nov-89	BU-4-34-1		1229990	754634	0			FD	0	0.17	2	37		0		139		521		1620	J		B	Y	Y	R	N	Y		
1391	BUTSO91D	BU-4	22-Nov-89	BU-4-35-1		1230156	754692	0			FD	0	0.17	2	32	J	0		187	J	478		2030			B	Y	Y	R	N	Y		
1392	BUTSO91D	BU-4	27-Nov-89	BU-4-37-1		1228992	754713	0			FD	0	0.17	2	12	J	0		24	J	14		57			B	Y	Y	R	N	Y		
1393	BUTSO91D	BU-4	29-Nov-89	BU-4-52-1		1227455	753771	0			FD	0	0.17	2	47		0		134		528		3050	J		B	Y	Y	R	N	Y		
1394	BUTSO91D	BU-4	22-Nov-89	BU-4-66-1		1228900	754843	0			FD	0	0.17	2	67		0		261		1860		2280	J		B	Y	Y	R	Y	Y		
1395	BUTSO91D	BU-4	22-Nov-89	BU-4-66-2		1228954	754763	0			FD	0	0.17	2	15	J	0		80	J	369	J	734			B	Y	Y	R	N	Y		
1396	BUTSO91D	BU-4	22-Nov-89	BU-4-68-1		1228799	754819	0			FD	0	0.17	2	67	J	0		264	J	1680	J	1470			B	Y	Y	R	N	Y		
1397	BUTSO91D	BU-4	25-Nov-89	BU-4-73-1		1228341	754741	0			FD	0	0.17	2	2	J	0		12	J	15	J	62			B	Y	Y	R	N	Y		
1398	BUTSO91D	BU-4	25-Nov-89	BU-4-74-1		1228180	754709	0			FD	0	0.17	2	12	J	0		23	J	14	J	57			B	Y	Y	R	N	Y		
1399	BUTSO91D	BU-4	27-Nov-89	BU-4-80-1		1227888	754643	0			FD	0	0.17	2	15	J	0		79	J	221	J	614			B	Y	Y	R	N	Y		
1400	BUTSO91D	BU-4	27-Nov-89	BU-4-82-1		1227745	754406	0			FD	0	0.17	2	28		0		150		297		805	J		B	Y	Y	R	N	Y		
1401	BUTSO91D	BU-5	20-Nov-89	BU-5-2-1		1229985	753155	0			FD	0	0.17	2	37	J	0		168	J	992		1590			B	Y	Y	R	N	Y		
1402	BUTSO91D	BU-5	21-Nov-89	BU-5-7-1		1230497	752880	0			FD	0	0.17	2	29	J	0		133	J	468		553			B	Y	Y	R	N	Y		
1403	BUTSO91D	BU-5	21-Nov-89	BU-5-9-2		1229981	753032	0			FD	0	0.17	2	22	J	0		89	J	461		1060			B	Y	Y	R	N	Y		
1404	BUTSO91D	BU-5	20-Nov-89	BU-5-37-1		1230524	752960	0			FD	0	0.17	2	68	J	0		507	J	1270		1750			B	Y	Y	R	N	Y		
1405	BUTSO91D	BU-5	28-Nov-89	BU-5-51-1		1229808	753221	0			FD	0	0.17	2	24	J	0		119	J	1680		2830			B	Y	Y	R	Y	Y		
1406	BUTSO91D	BU-5	21-Nov-89	BU-5-63-1		1229714	753056	0			FD	0	0.17	2	42	J	0		140	J	605	J	890			B	Y	Y	R	N	Y		
1407	BUTSO91D	BU-5	21-Nov-89	BU-5-71-1		1229802	753063	0			FD	0	0.17	2	28	J	0		124	J	765	J	2120			B	Y	Y	R	N	Y		
1408	BUTSO91D	BU-7	07-Dec-89	BU-7-1-1		1225901	752459	0			FD	0	0.17	2	45		0		130		236		420	J		B	Y	Y	R	Y	Y		
1409	BUTSO91D	BU-7	20-Dec-89	BU-7-14-1		1228610	753172	0			FD	0	0.17	2	16		0		170		218		459	J		B	Y	Y	R	N	Y		
1410	BUTSO91D	BU-10	09-Dec-89	BU-10-13		1228398	751401	0			FD	0	0.17	2	20		0		118		99		350	J		A	Y	Y	R	Y	Y		
1411	BUTSO91D	BU-11	07-Dec-89	BU-11-3-1		1228064	750979	0			FD	0	0.17	2	138		0		294		943		1350	J		B	Y	Y	R	Y	Y		
1412	BUTSO91D	BU-20	06-Dec-89	BU-20-1-1		1229508	749710	0			FD	0	0.17	2	70		0		393		463		527	J		B	Y	Y	R	Y	Y		
1413	BUTSO91D	BU-12	01-Dec-89	BU-12-1-1																													



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measure-ment Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic mg/kg Qual.	Cadmium mg/kg Qual.	Copper mg/kg Qual.	Lead mg/kg Qual.	Zinc mg/kg Qual.	pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
1451	BUTSO87C	BC-21	13-Jan-87	SO-524	WET	1226384	749731	0			FD	0	0.08	2	34	8	648	276	2760		BALLFIELD NW OF ANSE		B	Y	Y	R	Y	Y
1452	BUTSO87C	BC-22	13-Jan-87	SO-525	WET	1226753	748791	0			FD	0	0.08	2	46	5	124	1690	1640		HOOPS AREA E OF LOD		B	Y	Y	R	Y	Y
1453	BUTSO87C	BC-23	13-Jan-87	SO-529	WET	1229817	748458	0			FD	0	0.08	2	12	1	51	19	156		EDNA LACASS MEMORIAL		B	Y	Y	R	Y	Y
1454	BUTSO87C	BC-24	13-Jan-87	SO-530	WET	1228829	748396	0			FD	0	0.08	2	41	1	658	84	210		PARKBUS STOP, PARK		B	Y	Y	R	Y	Y
1455	BUTSO87C	BC-25	13-Jan-87	SO-533	WET	1233818	746690	0			FD	0	0.08	2	9	1	77	21	77		PARK AT CONTINENTAL		B	Y	Y	R	Y	Y
1456	BUTSO87C	BC-26	13-Jan-87	SO-534	WET	1231905	745616	0			FD	0	0.08	2	70	4	374	840	1030		HEBGEN FIELD ON SECO		B	Y	Y	R	Y	Y
1457	BUTSO87C	BC-27	13-Jan-87	SO-535	WET	1231722	745280	0			FD	0	0.08	2	60	5	272	1390	1650		HEBGEN PARK 1ST ST		B	Y	Y	R	Y	Y
1458	BUTSO87C	BC-28	13-Jan-87	SO-536	WET	1231405	745131	0			FD	0	0.08	2	12	2	71	183	1080		MONROE SCHOOL, ARIZ		B	Y	Y	R	Y	Y
1459	BUTSO87C	BC-29	13-Jan-87	SO-537	WET	1229700	744273	0			FD	0	0.08	2	39	1	99	49	195		CHARLEY JIPP MEMORI		B	Y	Y	R	Y	Y
1460	BUTSO87C	BC-30	13-Jan-87	SO-538	WET	1227684	745790	0			FD	0	0.08	2	27	2	161	363	455		SEMINOLE PARK AT AL		B	Y	Y	R	Y	Y
1461	BUTSO87C	BC-31	13-Jan-87	SO-539	WET	1228392	743380	0			FD	0	0.08	2	15	1	39	27	102		WEBSTER-GARFIELD SC		B	Y	Y	R	Y	Y
1462	BUTSO87C	BC-32	13-Jan-87	SO-540	WET	1228712	743376	0			FD	0	0.08	2	7	1	33	80	171		COMMUNITY DAY CARE		B	Y	Y	R	Y	Y
1463	BUTSO87C	BC-33	14-Jan-87	SO-541	WET	1229357	747059	0			FD	0	0.08	2	39	7	141	481	4590		BUTTE HIGH SCHOOL		B	Y	Y	R	Y	Y
1464	BUTSO87C	BC-34	14-Jan-87	SO-542	WET	1227761	748305	0			FD	0	0.08	2	14	1	60	83	191		CENTRAL HIGH SCHOOL		B	Y	Y	R	Y	Y
1465	BUTSO87C	BC-35	14-Jan-87	SO-543	WET	1224743	746198	0			FD	0	0.08	2	10	1	33	110	165		WEST JR. HIGH, EMMI		B	Y	Y	R	Y	Y
1466	BUTSO87C	BC-36	14-Jan-87	SO-544	WET	1226226	737372	0			FD	0	0.08	2	66	1	124	64	236		MOTOCROSS AREA, N O		B	N	N	R	Y	Y
1467	BUTSO87C	BC-37	14-Jan-87	SO-545	WET	1230338	741914	0			FD	0	0.08	2	8	1	61	48	133		HOCKEY RINK OF KAW A		B	Y	Y	R	Y	Y
1484	BUTSO87C	BC-52	15-Jan-87	SO-568	WET	1228681	740276	0			FD	0	0.08	2	35	1	101	44	206		OLD MADISON SCHOOL		B	Y	Y	R	Y	Y
1486	BUTSO87C	BC-54	15-Jan-87	SO-570	WET	1224038	748419	0			FD	0	0.08	2	27	1	76	73	271		MONTANA TECH FIELD		B	Y	Y	R	Y	Y
1487	BUTSO87C	BC-55	15-Jan-87	SO-571	WET	1233932	745184	0			FD	0	0.08	2	3	1	27	9	56		CIVIC CENTER FIELDS		B	Y	Y	R	Y	Y
1488	BUTSD89A	SD-129	16-Jun-89	01		1231300	742400	0	8-93631	MHN528		0	1.3	0	569	8	2010	546	3120					Y	Y	N	Y	
1489	BUTSD89A	SD-129	16-Jun-89	01		1231300	742400	0				0	1.3	0	450	11	2448	510	3027					Y	Y	N	N	
1490	BUTSD89A	SD-133	16-Jun-89	01		1234000	744100	0				0	1.08	0	327	6	2221	444	1562					Y	Y	N	Y	
1491	BUTSD89A	SD-152	22-Jun-89	01		1226600	743100	0				0	1.3	0	1328	20	1912	1682	2075					N	Y	N	Y	
1494	BUTSD89A	SD-512	22-Jun-89	02		1224833	742046	0				0.1	1.5	0	615	21	6050	965	5774					N	Y	N	Y	
1495	BUTSD89A	SD-513	22-Jun-89	02		1224948	742432	0				0.1	1.5	0	301	57	6084	1538	17120					N	Y	N	Y	
1496	BUTSD89A	SD-515	23-Jun-89	01		1224225	741768	0	8-94280	MHT880		0.1	1.5	0	62	4	937	147	1120					N	Y	N	N	
1497	BUTSD89A	SD-515	23-Jun-89	01		1224225	741768	0				0.1	1.5	0	270	13	904	444	1386					N	Y	N	Y	
1498	BUTSD89A	SD-601	28-Jun-89	01		1236121	745213	0				0	0.1	0	63	9	683	258	431					Y	Y	N	Y	
1499	BUTSD89A	SD-603	28-Jun-89	01		1235306	744815	0				0	0.1	0	63	2	515	258	433					Y	Y	N	Y	
1500	BUTSD89A	SD-611	26-Jun-89	02A		1233905	744842	0				0.1	1.3	0	63	4	329	258	294					Y	Y	N	N	
1668	BUTSO97A	SO-GG-C	03-Nov-97	BPSOU-119	DRY	1227001	736950	0	7-2513		FD	0	0.167	0	348	6	1620	458	2190		Grove Gulch		A	Y	Y	N	Y	
1669	BUTSO97A	SO-GG-C	03-Nov-97	BPSOU-119	DRY	1227001	736950	0	7-2514		DU	0	0.167	0	331	4	1440	452	1940		Grove Gulch		A	Y	Y	N	N	
1670	BUTSO97A	SO-GG-E	03-Nov-97	BPSOU-119	DRY	1228018	737527	0	7-2516		FD	0	0.167	0	16	4	72	58	200		Grove Gulch		A	Y	Y	N	Y	
1671	BUTSO97A	SO-GG-F	03-Nov-97	BPSOU-119	DRY	1228270	737753	0	7-2517		FD	0	0.167	0	26	4	90	91	574		Grove Gulch		A	Y	Y	N	Y	
1672	BUTSO97A	SO-GG-G	03-Nov-97	BPSOU-119	DRY	1228712	738006	0	7-2518		FD	0	0.167	0	161	4	288	361	1000		Grove Gulch		A	Y	Y	N	Y	
1673	BUTSO97A	SO-GG-H	03-Nov-97	BPSOU-119	DRY	1228890	738191	0	7-2519		FD	0	0.167	0	8	4	44	23	93		Grove Gulch		A	Y	Y	N	Y	
1674	BUTSO97A	SO-GG-I	03-Nov-97	BPSOU-119	DRY	1229147	738501	0	7-2520		FD	0	0.167	0	668	4	1510	95	560		Grove Gulch		A	Y	Y	R	Y	Y
1675	BUTSO97A	SO-GG-J	03-Nov-97	BPSOU-119	DRY	1230496	739320	0	7-2521		FD	0	0.167	0	41	4	142	141	685		Grove Gulch		A	Y	Y	N	Y	
1676	BUTSO97A	SO-GG-L	03-Nov-97	BPSOU-119	DRY	1230529	740492	0	7-2523		FD	0	0.167	0	15	4	104	46	153		Grove Gulch		A	Y	Y	N	Y	
1677	BUTSO91B	HCA-07	07-Dec-91	HCA-07-00		1223100	742343	0			FD	0	1	0	29	0	31	23	62					N	Y	N	Y	
1678	BUTSO91B	HCA-32	21-Oct-91	HCA-32-00		1226891	742938	0			FD	0	1	0	785	0	1770	1270	2770					N	Y	N	Y	
1679	BUTSO91B	S-1	15-Nov-91	S-1		1226962	742114	0			FD	0	0	0	941	0	887	4440	8040					N	Y	N	Y	
1680	BUTSO91B	S-2	15-Nov-91	S-2		1227106	742064	0			FD	0	0	0	11900	0	1950	740	1410					N	Y	N	Y	
1681	BUTSO91B	S-3	15-Nov-91	S-3		1227439	742110	0			FD	0	0	0	3380	0	478	1640	2910					N	Y	N	Y	
1682		EPRY01	01-May-92	EPRY01		1227343	754123	0	EPRY01	2E16-6	FD	0	0.08	0	19	4	198	988	1620		1501 4th Street	*CDM, 1992, Buffalo		Y	Y	N	Y	Y
1683		EPRY02	01-May-92	EPRY02		1229896	753427	0	EPRY02	2E16-7	FD	0	0.08	0	20	5	157	1010	1480		24 O'Neil Street	*CDM, 1992, Buffalo		Y	Y	N	Y	Y
1684		EPRY03	01-May-92	EPRY03		1229765	745869	0	EPRY03	2E16-8	FD	0	0.08	0	199	18	1300	1860	6020		721 Nevada	*CDM, 1992, Buffalo		Y	Y	R	Y	Y
1685		EPRY04	01-May-92	EPRY04		1228116	737407	0	EPRY04	2E16-9	FD	0	0.08	0	182	6	377	521	1730		2800 Hanson	*CDM, 1992, Buffalo		Y	Y	N	Y	Y
1687	BUTSO91E	9 N SUNV	21-Aug-90	Perimeter		1229923	756445	0				0	0.2	0	61	0	0	677	0		9 N SUNVIEW TERRACE			Y	Y	R	Y	Y
1688	BUTSO91E	9 N SUNV	21-Aug-90	Bare Area		1229923	756445	0				0	0.2	0	44	0	0	447	0		9 N SUNVIEW TERRACE			Y	Y	R	N	Y
1689	BUTSO91E	11 N SUN	24-Aug-90	Perimeter		1229977	756434	0				0	0.2	0	48	0	0	2174	0		11 N SUNVIEW TERRAC			Y	Y	R	Y	Y
1690	BUTSO91E	11 N SUN	24-Aug-90	Play Area		1229977	756434	0				0	0.2	0	41	0	0	1133	0		11 N SUNVIEW TERRAC			Y	Y	R	N	Y
1691	BUTSO91E	11 N SUN	24-Aug-90	Bare Area		1229977	756434	0				0	0.2	0	49	0	0	1588	0		11 N SUNVIEW TERRAC			Y	Y	R	N	Y
1692	BUTSO91E	935 W CO	14-Aug-90	Perimeter		1225374	749686	0				0	0.2	0	103	0	0	3387	0		935 W COPPER			Y	Y	R	Y	Y
1693	BUTSO91E	935 W CO	14-Aug-90	Play Area		1225374	749686	0				0	0.2	0	55	0	0	1273	0		935 W COPPER			Y	Y	R	N	Y
1694	BUTSO91E	935 W CO	14-Aug-90	Bare Area		1225374	749686	0				0	0.2	0	80	0	0	2984	0		935 W COPPER			Y	Y	R	N	Y



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic mg/kg	Arsenic Qual	Cadmium mg/kg	Cadmium Qual	Copper mg/kg	Copper Qual	Lead mg/kg	Lead Qual	Zinc mg/kg	Zinc Qual	pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
1713	BUTSO91E	1251 CAL	22-Aug-90	Play Area		1224057	750013	0				0	0.2	0	6		0		0		93		0			1251 CALEDONIA			Y	Y	R	N	Y
1714	BUTSO91E	1251 CAL	22-Aug-90	Garden		1224057	750013	0				0	0.2	0	38		0		0		891		0			1251 CALEDONIA			Y	Y	R	N	Y
1715	BUTSO91E	1251 CAL	22-Aug-90	Bare Area		1224057	750013	0				0	0.2	0	36		0		0		1388		0			1251 CALEDONIA			Y	Y	R	N	Y
1716	BUTSO91E	1139 CAL	15-Aug-90	Perimeter		1224397	749999	0				0	0.2	0	28		0		0		433		0			1139 CALEDONIA			Y	Y	R	N	Y
1717	BUTSO91E	1139 CAL	15-Aug-90	Play Area		1224397	749999	0				0	0.2	0	13		0		0		107		0			1139 CALEDONIA			Y	Y	R	N	Y
1718	BUTSO91E	1133 CAL	14-Aug-90	Perimeter		1224507	750018	0				0	0.2	0	36		0		0		729		0			1133 CALEDONIA			Y	Y	R	N	Y
1719	BUTSO91E	1133 CAL	14-Aug-90	Play Area		1224507	750018	0				0	0.2	0	40		0		0		1048		0			1133 CALEDONIA			Y	Y	R	N	Y
1720	BUTSO91E	1133 CAL	14-Aug-90	Bare Area		1224507	750018	0				0	0.2	0	33		0		0		408		0			1133 CALEDONIA			Y	Y	R	N	Y
1721	BUTSO91E	1123 CAL	15-Aug-90	Perimeter		1224597	749990	0				0	0.2	0	32		0		0		530		0			1123 CALEDONIA			Y	Y	R	N	Y
1722	BUTSO91E	1123 CAL	15-Aug-90	Play Area		1224597	749990	0				0	0.2	0	29		0		0		416		0			1123 CALEDONIA			Y	Y	R	N	Y
1723	BUTSO91E	1123 CAL	15-Aug-90	Bare Area		1224597	749990	0				0	0.2	0	30		0		0		585		0			1123 CALEDONIA			Y	Y	R	N	Y
1724	BUTSO91E	943 CALE	01-Sep-90	Perimeter		1225323	749961	0				0	0.2	0	61		0		0		1238		0			943 CALEDONIA			Y	Y	R	N	Y
1725	BUTSO91E	943 CALE	01-Sep-90	Garden		1225323	749961	0				0	0.2	0	69		0		0		1306		0			943 CALEDONIA			Y	Y	R	N	Y
1726	BUTSO91E	943 CALE	01-Sep-90	Bare Area		1225323	749961	0				0	0.2	0	92		0		0		1394		0			943 CALEDONIA			Y	Y	R	N	Y
1727	BUTSO91E	926 W WO	30-Aug-90	Perimeter		1225447	750073	0				0	0.2	0	69		0		0		2018		0			926 W WOOLMAN			Y	Y	R	N	Y
1728	BUTSO91E	926 W WO	30-Aug-90	Play Area		1225447	750073	0				0	0.2	0	16		0		0		112		0			926 W WOOLMAN			Y	Y	R	N	Y
1729	BUTSO91E	926 W WO	30-Aug-90	Garden		1225447	750073	0				0	0.2	0	49		0		0		799		0			926 W WOOLMAN			Y	Y	R	N	Y
1730	BUTSO91E	926 W WO	30-Aug-90	Bare Area		1225447	750073	0				0	0.2	0	46		0		0		1208		0			926 W WOOLMAN			Y	Y	R	N	Y
1731	BUTSO91E	1134 W W	13-Aug-90	Perimeter		1224470	750113	0				0	0.2	0	22		0		0		342		0			1134 W WOOLMAN			Y	Y	R	N	Y
1732	BUTSO91E	1134 W W	13-Aug-90	Play Area		1224470	750113	0				0	0.2	0	3		0		0		11		0			1134 W WOOLMAN			Y	Y	R	N	Y
1733	BUTSO91E	1134 W W	13-Aug-90	Bare Area		1224470	750113	0				0	0.2	0	14		0		0		204		0			1134 W WOOLMAN			Y	Y	R	N	Y
1734	BUTSO91E	1148 W W	16-Aug-90	Perimeter		1224434	750114	0				0	0.2	0	30		0		0		213		0			1148 W WOOLMAN			Y	Y	R	N	Y
1735	BUTSO91E	1148 W W	16-Aug-90	Play Area		1224434	750114	0				0	0.2	0	73		0		0		358		0			1148 W WOOLMAN			Y	Y	R	N	Y
1736	BUTSO91E	1148 W W	16-Aug-90	Garden		1224434	750114	0				0	0.2	0	22		0		0		214		0			1148 W WOOLMAN			Y	Y	R	N	Y
1737	BUTSO91E	1148 W W	16-Aug-90	Bare Area		1224434	750114	0				0	0.2	0	53		0		0		250		0			1148 W WOOLMAN			Y	Y	R	N	Y
1738	BUTSO91E	1164 W W	14-Aug-90	Perimeter		1224363	750117	0				0	0.2	0	15		0		0		192		0			1164 W WOOLMAN			Y	Y	R	N	Y
1739	BUTSO91E	1164 W W	14-Aug-90	Play Area		1224363	750117	0				0	0.2	0	18		0		0		266		0			1164 W WOOLMAN			Y	Y	R	N	Y
1740	BUTSO91E	1164 W W	14-Aug-90	Bare Area		1224363	750117	0				0	0.2	0	24		0		0		212		0			1164 W WOOLMAN			Y	Y	R	N	Y
1741	BUTSO91E	1221 W W	23-Aug-90	Perimeter		1223980	750326	0				0	0.2	0	31		0		0		171		0			1221 W WOOLMAN			Y	Y	R	N	Y
1742	BUTSO91E	1221 W W	23-Aug-90	Play Area		1223980	750326	0				0	0.2	0	17		0		0		284		0			1221 W WOOLMAN			Y	Y	R	N	Y
1743	BUTSO91E	1221 W W	23-Aug-90	Garden		1223980	750326	0				0	0.2	0	19		0		0		73		0			1221 W WOOLMAN			Y	Y	R	N	Y
1744	BUTSO91E	1115 W W		Perimeter		1224649	750263	0				0	0.2	0	30		0		0		546		0			1115 W WOOLMAN			Y	Y	R	N	Y
1745	BUTSO91E	1115 W W		Bare Area		1224649	750263	0				0	0.2	0	31		0		0		335		0			1115 W WOOLMAN			Y	Y	R	N	Y
1746	BUTSO91E	517 N EX	06-Sep-90	Perimeter		1225597	750046	0				0	0.2	0	58		0		0		912		0			517 N EXCELSIOR AV			Y	Y	R	N	Y
1747	BUTSO91E	517 N EX	06-Sep-90	Play Area		1225597	750046	0				0	0.2	0	45		0		0		98		0			517 N EXCELSIOR AV			Y	Y	R	N	Y
1748	BUTSO91E	517 N EX	06-Sep-90	Garden		1225597	750046	0				0	0.2	0	60		0		0		1129		0			517 N EXCELSIOR AV			Y	Y	R	N	Y
1749	BUTSO91E	517 N EX	06-Sep-90	Bare Area		1225597	750046	0				0	0.2	0	70		0		0		1137		0			517 N EXCELSIOR AV			Y	Y	R	N	Y
1750	BUTSO91E	1016 LEW	13-Aug-90	Perimeter		1225048	750638	0				0	0.2	0	47		0		0		674		0			1016 LEWISHON ST			Y	Y	R	N	Y
1751	BUTSO91E	1016 LEW	13-Aug-90	Play Area		1225048	750638	0				0	0.2	0	50		0		0		154		0			1016 LEWISHON ST			Y	Y	R	N	Y
1752	BUTSO91E	1016 LEW	13-Aug-90	Bare Area		1225048	750638	0				0	0.2	0	59		0		0		917		0			1016 LEWISHON ST			Y	Y	R	N	Y
1753	BUTSO91E	515 HENR	28-Aug-90	Perimeter		1225074	750051	0				0	0.2	0	89		0		0		1432		0			515 HENRY AV			Y	Y	R	N	Y
1754	BUTSO91E	515 HENR	28-Aug-90	Garden		1225074	750051	0				0	0.2	0	26		0		0		476		0			515 HENRY AV			Y	Y	R	N	Y
1755	BUTSO91E	515 HENR	28-Aug-90	Bare Area		1225074	750051	0				0	0.2	0	63		0		0		541		0			515 HENRY AV			Y	Y	R	N	Y
1756	BUTSO91E	514 N EM	15-Aug-90	Perimeter		1224887	750066	0				0	0.2	0	73		0		0		901		0			514 N EMMET AV			Y	Y	R	N	Y
1757	BUTSO91E	514 N EM	15-Aug-90	Play Area		1224887	750066	0				0	0.2	0	47		0		0		602		0			514 N EMMET AV			Y	Y	R	N	Y
1758	BUTSO91E	514 N EM	15-Aug-90	Garden		1224887	750066	0				0	0.2	0	51		0		0		975		0			514 N EMMET AV			Y	Y	R	N	Y
1759	BUTSO91E	514 N EM	15-Aug-90	Bare Area		1224887	750066	0				0	0.2	0	56		0		0		630		0			514 N EMMET AV			Y	Y	R	N	Y
1760	BUTSO91E	518 N EM	17-Aug-90	Perimeter		1224888	750118	0				0	0.2	0	31		0		0		891		0			518 N EMMET AV			Y	Y	R	N	Y
1761	BUTSO91E	518 N EM	17-Aug-90	Play Area		1224888	750118	0				0	0.2	0	12		0		0		113		0			518 N EMMET AV			Y	Y	R	N	Y
1762	BUTSO91E	518 N EM	17-Aug-90	Bare Area		1224888	750118	0				0	0.2	0	27		0		0		188		0			518 N EMMET AV			Y	Y	R	N	Y
1763	BUTSO91E	518 N EM	22-Aug-90	Perimeter		1224888	750118	0				0	0.2	0	36		0		0		1138		0			518 N EMMET AV			Y	Y	R	N	Y
1764	BUTSO91E	518 N EM	22-Aug-90	Play Area		1224888	750118	0				0	0.2	0	33		0		0		375		0			518 N EMMET AV			Y	Y	R	N	Y
1765	BUTSO91E	518 N EM	22-Aug-90	Bare Area		1224888	750118	0				0	0.2	0	22		0		0		202		0			518 N EMMET AV			Y	Y	R	N	Y
1766	BUTSO91E	1149 ANT	27-Aug-90	Perimeter		1224441	750550	0				0	0.2	0	27		0		0		217</												



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic		Cadmium		Copper		Lead		Zinc		pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
															mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.									
1788	BUTSO91E	1001 WAU	14-Aug-90	Perimeter		1225155	751052	0				0	0.2	0	53	0	0	0	371	0				1001 WAUKESHA ST		Y	Y	R	Y	Y			
1789	BUTSO91E	715 N EM	16-Aug-90	Perimeter		1224759	750622	0				0	0.2	0	30	0	0	0	611	0				715 N EMMET AV		Y	Y	R	N	Y			
1790	BUTSO91E	715 N EM	16-Aug-90	Garden		1224759	750622	0				0	0.2	0	33	0	0	0	972	0				715 N EMMET AV		Y	Y	R	Y	Y			
1791	BUTSO91E	715 N EM	16-Aug-90	Bare Area		1224759	750622	0				0	0.2	0	42	0	0	0	404	0				715 N EMMET AV		Y	Y	R	N	Y			
1792	BUTSO91E	911 HENR	13-Aug-90	Perimeter		1225156	751097	0				0	0.2	0	49	0	0	0	682	0				911 HENRY AV		Y	Y	R	N	Y			
1793	BUTSO91E	911 HENR	13-Aug-90	Play Area		1225156	751097	0				0	0.2	0	30	0	0	0	99	0				911 HENRY AV		Y	Y	R	N	Y			
1794	BUTSO91E	911 HENR	13-Aug-90	Bare Area		1225156	751097	0				0	0.2	0	70	0	0	0	789	0				911 HENRY AV		Y	Y	R	Y	Y			
1795	BUTSO91E	818 HENR		Perimeter		1225276	750868	0				0	0.2	0	44	0	0	0	882	0				818 HENRY AV		Y	Y	R	Y	Y			
1796	BUTSO91E	818 HENR		Play Area		1225276	750868	0				0	0.2	0	42	0	0	0	450	0				818 HENRY AV		Y	Y	R	N	Y			
1797	BUTSO91E	818 HENR		Bare Area		1225276	750868	0				0	0.2	0	50	0	0	0	530	0				818 HENRY AV		Y	Y	R	N	Y			
1798	BUTSO91E	801 N EX	29-Aug-90	Perimeter		1225642	750768	0				0	0.2	0	37	0	0	0	629	0				801 N EXCELSIOR AV		Y	Y	R	Y	Y			
1799	BUTSO91E	801 N EX	29-Aug-90	Play Area		1225642	750768	0				0	0.2	0	35	0	0	0	381	0				801 N EXCELSIOR AV		Y	Y	R	N	Y			
1800	BUTSO91E	801 N EX	29-Aug-90	Bare Area		1225642	750768	0				0	0.2	0	44	0	0	0	486	0				801 N EXCELSIOR AV		Y	Y	R	N	Y			
1801	BUTSO91E	826 N EX	28-Aug-90	Perimeter		1225755	750885	0				0	0.2	0	30	0	0	0	423	0				826 N EXCELSIOR AV		Y	Y	R	N	Y			
1802	BUTSO91E	826 N EX	28-Aug-90	Play Area		1225755	750885	0				0	0.2	0	20	0	0	0	257	0				826 N EXCELSIOR AV		Y	Y	R	N	Y			
1803	BUTSO91E	826 N EX	28-Aug-90	Garden		1225755	750885	0				0	0.2	0	30	0	0	0	423	0				826 N EXCELSIOR AV		Y	Y	R	N	Y			
1804	BUTSO91E	826 N EX	28-Aug-90	Bare Area		1225755	750885	0				0	0.2	0	41	0	0	0	622	0				826 N EXCELSIOR AV		Y	Y	R	Y	Y			
1805	BUTSO91E	825 14TH	17-Aug-90	Perimeter		1225944	753170	0				0	0.2	0	40	0	0	0	341	0				825 14TH STREET		Y	Y	R	N	Y			
1806	BUTSO91E	825 14TH	17-Aug-90	Play Area		1225944	753170	0				0	0.2	0	40	0	0	0	354	0				825 14TH STREET		Y	Y	R	Y	Y			
1807	BUTSO91E	825 14TH	17-Aug-90	Garden		1225944	753170	0				0	0.2	0	32	0	0	0	52	0				825 14TH STREET		Y	Y	R	N	Y			
1808	BUTSO91E	825 14TH	17-Aug-90	Bare Area		1225944	753170	0				0	0.2	0	50	0	0	0	351	0				825 14TH STREET		Y	Y	R	N	Y			
1809	BUTSO91E	945 15TH	20-Aug-90	Perimeter		1225431	753267	0				0	0.2	0	37	0	0	0	53	0				945 15TH STREET		Y	Y	R	N	Y			
1810	BUTSO91E	945 15TH	20-Aug-90	Play Area		1225431	753267	0				0	0.2	0	28	0	0	0	29	0				945 15TH STREET		Y	Y	R	N	Y			
1811	BUTSO91E	945 15TH	20-Aug-90	Garden		1225431	753267	0				0	0.2	0	56	0	0	0	86	0				945 15TH STREET		Y	Y	R	Y	Y			
1812	BUTSO91E	845 16TH	06-Sep-90	Perimeter		1225936	753387	0				0	0.2	0	31	0	0	0	268	0				845 16TH STREET		Y	Y	R	N	Y			
1813	BUTSO91E	845 16TH	06-Sep-90	Play Area		1225936	753387	0				0	0.2	0	23	0	0	0	62	0				845 16TH STREET		Y	Y	R	N	Y			
1814	BUTSO91E	845 16TH	06-Sep-90	Bare Area		1225936	753387	0				0	0.2	0	38	0	0	0	802	0				845 16TH STREET		Y	Y	R	Y	Y			
1815	BUTSO91E	735 6TH	13-Aug-90	Perimeter		1226306	752289	0				0	0.2	0	53	0	0	0	700	0				735 6TH STREET		Y	Y	R	N	Y			
1816	BUTSO91E	735 6TH	13-Aug-90	Garden		1226306	752289	0				0	0.2	0	40	0	0	0	828	0				735 6TH STREET		Y	Y	R	Y	Y			
1817	BUTSO91E	725 10TH	07-Sep-90	Perimeter		1226271	752960	0				0	0.2	0	29	0	0	0	414	0				725 10TH STREET		Y	Y	R	Y	Y			
1818	BUTSO91E	725 10TH	07-Sep-90	Play Area		1226271	752960	0				0	0.2	0	31	0	0	0	191	0				725 10TH STREET		Y	Y	R	N	Y			
1819	BUTSO91E	725 10TH	07-Sep-90	Bare Area		1226271	752960	0				0	0.2	0	26	0	0	0	244	0				725 10TH STREET		Y	Y	R	N	Y			
1820	BUTSO91E	815 10TH	14-Aug-90	Perimeter		1226052	752780	0				0	0.2	0	66	0	0	0	415	0				815 10TH STREET		Y	Y	R	Y	Y			
1821	BUTSO91E	815 10TH	14-Aug-90	Play Area		1226052	752780	0				0	0.2	0	36	0	0	0	160	0				815 10TH STREET		Y	Y	R	N	Y			
1822	BUTSO91E	815 10TH	14-Aug-90	Garden		1226052	752780	0				0	0.2	0	39	0	0	0	225	0				815 10TH STREET		Y	Y	R	N	Y			
1823	BUTSO91E	801 11TH	29-Aug-90	Perimeter		1226077	752889	0				0	0.2	0	53	0	0	0	159	0				801 11TH STREET		Y	Y	R	N	Y			
1824	BUTSO91E	801 11TH	29-Aug-90	Play Area		1226077	752889	0				0	0.2	0	33	0	0	0	211	0				801 11TH STREET		Y	Y	R	Y	Y			
1825	BUTSO91E	801 11TH	29-Aug-90	Garden		1226077	752889	0				0	0.2	0	42	0	0	0	79	0				801 11TH STREET		Y	Y	R	N	Y			
1826	BUTSO91E	801 11TH	29-Aug-90	Bare Area		1226077	752889	0				0	0.2	0	43	0	0	0	205	0				801 11TH STREET		Y	Y						



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic mg/kg Qual.	Cadmium mg/kg Qual.	Copper mg/kg Qual.	Lead mg/kg Qual.	Zinc mg/kg Qual.	pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
1863	BUTSO91E	935 EMPI	30-Aug-90	Garden		1225454	751339	0				0	0.2	0	68	0	0	258	0		935 EMPIRE ST		Y	Y	Y	N	Y	
1864	BUTSO91E	935 EMPI	30-Aug-90	Bare Area		1225454	751339	0				0	0.2	0	65	0	0	313	0		935 EMPIRE ST		Y	Y	Y	N	Y	
1865	BUTSO91E	1201 N A	21-Aug-90	Perimeter		1226149	751863	0				0	0.2	0	77	0	0	789	0		1201 N ALABAMA		Y	Y	Y	R	Y	
1866	BUTSO91E	1201 N A	21-Aug-90	Play Area		1226149	751863	0				0	0.2	0	74	0	0	278	0		1201 N ALABAMA		Y	Y	Y	R	Y	
1867	BUTSO91E	1201 N A	21-Aug-90	Garden		1226149	751863	0				0	0.2	0	64	0	0	373	0		1201 N ALABAMA		Y	Y	Y	R	Y	
1868	BUTSO91E	1201 N A	21-Aug-90	Bare Area		1226149	751863	0				0	0.2	0	50	0	0	357	0		1201 N ALABAMA		Y	Y	Y	R	Y	
1869	BUTSO91E	1214 N E	14-Aug-90	Perimeter		1225810	751961	0				0	0.2	0	33	0	0	591	0		1214 N EXCELSIOR AV		Y	Y	Y	R	Y	
1870	BUTSO91E	1214 N E	14-Aug-90	Garden		1225810	751961	0				0	0.2	0	44	0	0	530	0		1214 N EXCELSIOR AV		Y	Y	Y	R	Y	
1871	BUTSO91E	1214 N E	14-Aug-90	Bare Area		1225810	751961	0				0	0.2	0	40	0	0	434	0		1214 N EXCELSIOR AV		Y	Y	Y	R	Y	
1872	BUTSO91E	305 W CO	04-Sep-90	Perimeter		1227829	749765	0				0	0.2	0	78	0	0	2677	0		305 W COPPER		Y	Y	Y	R	Y	
1873	BUTSO91E	305 W CO	04-Sep-90	Play Area		1227829	749765	0				0	0.2	0	10	0	0	2808	0		305 W COPPER		Y	Y	Y	R	Y	
1874	BUTSO91E	305 W CO	04-Sep-90	Bare Area		1227829	749765	0				0	0.2	0	80	0	0	3165	0		305 W COPPER		Y	Y	Y	R	Y	
1875	BUTSO91E	409 W CO	06-Sep-90	Perimeter		1227388	749715	0				0	0.2	0	28	0	0	696	0		409 W COPPER		Y	Y	Y	R	Y	
1876	BUTSO91E	409 W CO	06-Sep-90	Play Area		1227388	749715	0				0	0.2	0	24	0	0	479	0		409 W COPPER		Y	Y	Y	R	Y	
1877	BUTSO91E	409 W CO	06-Sep-90	Garden		1227388	749715	0				0	0.2	0	25	0	0	722	0		409 W COPPER		Y	Y	Y	R	Y	
1878	BUTSO91E	409 W CO	06-Sep-90	Bare Area		1227388	749715	0				0	0.2	0	23	0	0	330	0		409 W COPPER		Y	Y	Y	R	Y	
1879	BUTSO91E	607 W CO	24-Aug-90	Perimeter		1226846	749726	0				0	0.2	0	107	0	0	990	0		607 W COPPER		Y	Y	Y	R	Y	
1880	BUTSO91E	607 W CO	24-Aug-90	Play Area		1226846	749726	0				0	0.2	0	57	0	0	104	0		607 W COPPER		Y	Y	Y	R	Y	
1881	BUTSO91E	607 W CO	24-Aug-90	Bare Area		1226846	749726	0				0	0.2	0	81	0	0	549	0		607 W COPPER		Y	Y	Y	R	Y	
1882	BUTSO91E	454 N ID	16-Aug-90	Perimeter		1227727	749904	0				0	0.2	0	89	0	0	1263	0		454 N IDAHO ST		Y	Y	Y	R	Y	
1883	BUTSO91E	454 N ID	16-Aug-90	Play Area		1227727	749904	0				0	0.2	0	81	0	0	944	0		454 N IDAHO ST		Y	Y	Y	R	Y	
1884	BUTSO91E	454 N ID	16-Aug-90	Bare Area		1227727	749904	0				0	0.2	0	215	0	0	2173	0		454 N IDAHO ST		Y	Y	Y	R	Y	
1885	BUTSO91E	210 W WO	21-Aug-90	Perimeter		1227853	750245	0				0	0.2	0	97	0	0	2253	0		210 W WOOLMAN		N	Y	Y	R	Y	
1886	BUTSO91E	210 W WO	21-Aug-90	Play Area		1227853	750245	0				0	0.2	0	72	0	0	1188	0		210 W WOOLMAN		N	Y	Y	R	Y	
1887	BUTSO91E	210 W WO	21-Aug-90	Bare Area		1227853	750245	0				0	0.2	0	91	0	0	2452	0		210 W WOOLMAN		N	Y	Y	R	Y	
1888	BUTSO91E	419 N JA		Perimeter		1227178	749793	0				0	0.2	0	99	0	0	1169	0		419 N JACKSON ST		Y	Y	Y	R	Y	
1889	BUTSO91E	419 N JA		Play Area		1227178	749793	0				0	0.2	0	66	0	0	889	0		419 N JACKSON ST		Y	Y	Y	R	Y	
1890	BUTSO91E	419 N JA		Bare Area		1227178	749793	0				0	0.2	0	67	0	0	703	0		419 N JACKSON ST		Y	Y	Y	R	Y	
1891	BUTSO91E	504 W WO	20-Aug-90	Perimeter		1227168	750223	0				0	0.2	0	67	0	0	779	0		504 W WOOLMAN		Y	Y	Y	R	Y	
1892	BUTSO91E	504 W WO	20-Aug-90	Bare Area		1227168	750223	0				0	0.2	0	68	0	0	695	0		504 W WOOLMAN		Y	Y	Y	R	Y	
1893	BUTSO91E	513 CALE	24-Aug-90	Perimeter		1227133	749954	0				0	0.2	0	64	0	0	612	0		513 CALEDONIA		Y	Y	Y	R	Y	
1894	BUTSO91E	513 CALE	24-Aug-90	Play Area		1227133	749954	0				0	0.2	0	38	0	0	462	0		513 CALEDONIA		Y	Y	Y	R	Y	
1895	BUTSO91E	513 CALE	24-Aug-90	Bare Area		1227133	749954	0				0	0.2	0	46	0	0	425	0		513 CALEDONIA		Y	Y	Y	R	Y	
1896	BUTSO91E	527 N FR	30-Aug-90	Perimeter		1226886	749962	0				0	0.2	0	72	0	0	813	0		527 N FRANKLIN ST		Y	Y	Y	R	Y	
1897	BUTSO91E	527 N FR	30-Aug-90	Play Area		1226886	749962	0				0	0.2	0	72	0	0	334	0		527 N FRANKLIN ST		Y	Y	Y	R	Y	
1898	BUTSO91E	527 N FR	30-Aug-90	Bare Area		1226886	749962	0				0	0.2	0	48	0	0	560	0		527 N FRANKLIN ST		Y	Y	Y	R	Y	
1899	BUTSO91E	524 EDIS	22-Aug-90	Perimeter		1226746	749960	0				0	0.2	0	25	0	0	470	0		524 EDISON		Y	Y	Y	R	Y	
1900	BUTSO91E	524 EDIS	22-Aug-90	Garden		1226746	749960	0				0	0.2	0	63	0	0	1336	0		524 EDISON		Y	Y	Y	R	Y	
1901	BUTSO91E	524 EDIS	22-Aug-90	Bare Area		1226746	749960	0				0	0.2	0	16	0	0	206	0		524 EDISON		Y	Y	Y	R	Y	
1902	BUTSO91E	540 EDIS	16-Aug-90	Perimeter		1226750	750195	0				0	0.2	0	76	0	0	685	0		540 EDISON		Y	Y	Y	R	Y	
1903	BUTSO91E	540 EDIS	16-Aug-90	Play Area		1226750	750195	0				0	0.2	0	48	0	0	751	0		540 EDISON		Y	Y	Y	R	Y	
1904	BUTSO91E	540 EDIS	16-Aug-90	Garden		1226750	750195	0				0	0.2	0	37	0	0	307	0		540 EDISON		Y	Y	Y	R	Y	
1905	BUTSO91E	540 EDIS	16-Aug-90	Bare Area		1226750	750195	0				0	0.2	0	46	0	0	329	0		540 EDISON		Y	Y	Y	R	Y	
1906	BUTSO91E	31 E COP	16-Aug-90	Perimeter		1229470	749830	0				0	0.2	0	56	0	0	983	0		31 E COPPER		Y	Y	Y	R	Y	
1907	BUTSO91E	31 E COP	16-Aug-90	Play Area		1229470	749830	0				0	0.2	0	64	0	0	239	0		31 E COPPER		Y	Y	Y	R	Y	
1908	BUTSO91E	31 E COP	16-Aug-90	Garden		1229470	749830	0				0	0.2	0	54	0	0	527	0		31 E COPPER		Y	Y	Y	R	Y	
1909	BUTSO91E	31 E COP	16-Aug-90	Bare Area		1229470	749830	0				0	0.2	0	71	0	0	2140	0		31 E COPPER		Y	Y	Y	R	Y	
1910	BUTSO91E	401 N MA	27-Aug-90	Perimeter		1228988	749768	0				0	0.2	0	76	0	0	1076	0		401 N MAIN		Y	Y	Y	R	Y	
1911	BUTSO91E	401 N MA	27-Aug-90	Play Area		1228988	749768	0				0	0.2	0	67	0	0	625	0		401 N MAIN		Y	Y	Y	R	Y	
1912	BUTSO91E	401 N MA	27-Aug-90	Bare Area		1228988	749768	0				0	0.2	0	81	0	0	1311	0		401 N MAIN		Y	Y	Y	R	Y	
1913	BUTSO91E	518 N MA	20-Aug-90	Perimeter		1229112	750234	0				0	0.2	0	69	0	0	1011	0		518 N MAIN		Y	Y	Y	R	Y	
1914	BUTSO91E	518 N MA	20-Aug-90	Play Area		1229112	750234	0				0	0.2	0	3	0	0	18	0		518 N MAIN		Y	Y	Y	R	Y	
1915	BUTSO91E	518 N MA	20-Aug-90	Garden		1229112	750234	0				0	0.2	0	77	0	0	1060	0		518 N MAIN		Y	Y	Y	R	Y	
1916	BUTSO91E	518 N MA	20-Aug-90	Bare Area		1229112	750234	0				0	0.2	0	71	0	0	1079	0		518 N MAIN		Y	Y	Y	R	Y	
1917	BUTSO91E	229 W BO	14-Aug-90	Perimeter		1227807	750777	0				0	0.2	0	64	0	0	813	0		229 W BOARDMAN		Y	Y	Y	R	Y	
1918	BUTSO91E	229 W BO	14-Aug-90	Play Area		1227807	750777	0				0	0.2	0	415	0	0	1735	0		229 W BOARDMAN		Y	Y	Y	R	Y	
1919	BUTSO91E	229 W BO	14-Aug-90	Bare Area		1227807	750777	0				0	0.2	0	57	0	0	1859	0		229 W BOARDMAN		Y	Y	Y	R	Y	
1920	BUTSO91E	209 W BO	20-Aug-90	Perimeter		1227958	750857	0				0	0.2	0	51	0	0	756	0		209 W BOARDMAN		Y	Y	Y	R	Y	
1921	BUTSO91E	209 W BO	20-Aug-90	Garden		1227958	750857	0				0	0.2	0	54	0	0	638	0		209 W BOARDMAN		Y	Y	Y	R	Y	
1922	BUTSO91E	209 W BO	20-Aug-90	Bare Area		1227958	750857	0				0	0.2	0	59	0	0	805	0		209 W BOARDMAN		Y	Y	Y	R	Y	
1923	BUTSO91E	103 SUTT	15-Aug-90	Perimeter		1228746	750881	0				0	0.2															



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic		Cadmium		Copper		Lead		Zinc		pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
															mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.									
1938	BUTSO91E	610 N AL	17-Aug-90	Play Area		1228635	750423	0				0	0.2	0	87	0		0		0		468	0		610 N ALASKA ST		Y	Y	R	N	Y		
1939	BUTSO91E	610 N AL	17-Aug-90	Bare Area		1228635	750423	0				0	0.2	0	50	0		0		0		395	0		610 N ALASKA ST		Y	Y	R	N	Y		
1940	BUTSO91E	23 W WOOL	24-Aug-90	Perimeter		1228734	750417	0				0	0.2	0	158	0		0		0		2028	0		23 W WOOLMAN		Y	Y	R	N	Y		
1941	BUTSO91E	23 W WOOL	24-Aug-90	Play Area		1228734	750417	0				0	0.2	0	110	0		0		0		2156	0		23 W WOOLMAN		Y	Y	R	Y	Y		
1942	BUTSO91E	23 W WOOL	24-Aug-90	Bare Area		1228734	750417	0				0	0.2	0	46	0		0		0		720	0		23 W WOOLMAN		Y	Y	R	N	Y		
1943	BUTSO91E	708 N WY	29-Aug-90	Perimeter		1229918	750657	0				0	0.2	0	57	0		0		0		1218	0		708 N WYOMING		Y	Y	R	N	Y		
1944	BUTSO91E	708 N WY	29-Aug-90	Play Area		1229918	750657	0				0	0.2	0	64	0		0		0		1516	0		708 N WYOMING		Y	Y	R	Y	Y		
1945	BUTSO91E	708 N WY	29-Aug-90	Bare Area		1229918	750657	0				0	0.2	0	80	0		0		0		936	0		708 N WYOMING		Y	Y	R	N	Y		
1946	BUTSO91E	724 N WY	22-Aug-90	Perimeter		1229987	750891	0				0	0.2	0	181	0		0		0		835	0		724 N WYOMING		Y	Y	R	N	Y		
1947	BUTSO91E	724 N WY	22-Aug-90	Bare Area		1229987	750891	0				0	0.2	0	108	0		0		0		854	0		724 N WYOMING		Y	Y	R	Y	Y		
1948	BUTSO91E	34 E SUM	28-Aug-90	Perimeter		1229524	751627	0				0	0.2	0	52	0		0		0		1228	0		34 E SUMMIT ST		Y	Y	R	Y	Y		
1949	BUTSO91E	34 E SUM	28-Aug-90	Play Area		1229524	751627	0				0	0.2	0	71	0		0		0		1192	0		34 E SUMMIT ST		Y	Y	R	N	Y		
1950	BUTSO91E	34 E SUM	28-Aug-90	Bare Area		1229524	751627	0				0	0.2	0	41	0		0		0		583	0		34 E SUMMIT ST		Y	Y	R	N	Y		
1951	BUTSO91E	123 MINA	13-Aug-90	Perimeter		1229469	751601	0				0	0.2	0	51	0		0		0		735	0		123 MINAH		Y	Y	R	N	Y		
1952	BUTSO91E	123 MINA	13-Aug-90	Play Area		1229469	751601	0				0	0.2	0	53	0		0		0		671	0		123 MINAH		Y	Y	R	N	Y		
1953	BUTSO91E	123 MINA	13-Aug-90	Garden		1229469	751601	0				0	0.2	0	64	0		0		0		854	0		123 MINAH		Y	Y	R	Y	Y		
1954	BUTSO91E	123 MINA	13-Aug-90	Bare Area		1229469	751601	0				0	0.2	0	54	0		0		0		788	0		123 MINAH		Y	Y	R	N	Y		
1955	BUTSO91E	108 MINA	20-Aug-90	Perimeter		1229512	751443	0				0	0.2	0	155	0		0		0		1098	0		108 MINAH		Y	Y	R	N	Y		
1956	BUTSO91E	108 MINA	20-Aug-90	Play Area		1229512	751443	0				0	0.2	0	52	0		0		0		1698	0		108 MINAH		Y	Y	R	Y	Y		
1957	BUTSO91E	108 MINA	20-Aug-90	Bare Area		1229512	751443	0				0	0.2	0	40	0		0		0		110	0		108 MINAH		Y	Y	R	N	Y		
1958	BUTSO91E	100 MINA	28-Aug-90	Perimeter		1229481	751418	0				0	0.2	0	63	0		0		0		1747	0		100 MINAH		Y	Y	R	Y	Y		
1959	BUTSO91E	100 MINA	28-Aug-90	Bare Area		1229481	751418	0				0	0.2	0	59	0		0		0		1260	0		100 MINAH		Y	Y	R	N	Y		
1960	BUTSO91E	147 MISS		Perimeter		1227636	752665	0				0	0.2	0	41	0		0		0		903	0		147 MISSOULA		Y	Y	R	N	Y		
1961	BUTSO91E	147 MISS		Play Area		1227636	752665	0				0	0.2	0	39	0		0		0		1061	0		147 MISSOULA		Y	Y	R	Y	Y		
1962	BUTSO91E	147 MISS		Bare Area		1227636	752665	0				0	0.2	0	48	0		0		0		967	0		147 MISSOULA		Y	Y	R	N	Y		
1963	BUTSO91E	31 MISSO		Perimeter		1228895	752791	0				0	0.2	0	56	0		0		0		3646	0		31 MISSOULA		N	Y	R	Y	Y		
1964	BUTSO91E	31 MISSO		Play Area		1228895	752791	0				0	0.2	0	59	0		0		0		1156	0		31 MISSOULA		N	Y	R	N	Y		
1965	BUTSO91E	31 MISSO		Bare Area		1228895	752791	0				0	0.2	0	41	0		0		0		3351	0		31 MISSOULA		N	Y	R	N	Y		
1966	BUTSO91E	909 N MA	14-Aug-90	Perimeter		1229175	752426	0				0	0.2	0	76	0		0		0		1803	0		909 N MAIN		Y	Y	R	N	Y		
1967	BUTSO91E	909 N MA	14-Aug-90	Play Area		1229175	752426	0				0	0.2	0	111	0		0		0		4272	0		909 N MAIN		Y	Y	R	Y	Y		
1968	BUTSO91E	909 N MA	14-Aug-90	Bare Area		1229175	752426	0				0	0.2	0	101	0		0		0		3295	0		909 N MAIN		Y	Y	R	N	Y		
1969	BUTSO91E	205 W PA	22-Aug-90	Perimeter		1228219	752446	0				0	0.2	0	60	0		0		0		1838	0		205 W PACIFIC ST		Y	Y	R	Y	Y		
1970	BUTSO91E	205 W PA	22-Aug-90	Play Area		1228219	752446	0				0	0.2	0	42	0		0		0		893	0		205 W PACIFIC ST		Y	Y	R	N	Y		
1971	BUTSO91E	205 W PA	22-Aug-90	Garden		1228219	752446	0				0	0.2	0	57	0		0		0		852	0		205 W PACIFIC ST		Y	Y	R	N	Y		
1972	BUTSO91E	205 W PA	22-Aug-90	Bare Area		1228219	752446	0				0	0.2	0	64	0		0		0		946	0		205 W PACIFIC ST		Y	Y	R	N	Y		
1973	BUTSO91E	15 W CEN	23-Aug-90	Perimeter		1229008	753047	0				0	0.2	0	52	0		0		0		1764	0		15 W CENTER		Y	Y	R	Y	Y		
1974	BUTSO91E	15 W CEN	23-Aug-90	Play Area		1229008	753047	0				0	0.2	0	72	0		0		0		1682	0		15 W CENTER		Y	Y	R	N	Y		
1975	BUTSO91E	15 W CEN	23-Aug-90	Bare Area		1229008	753047	0				0	0.2	0	85	0		0		0		1108	0		15 W CENTER		Y	Y	R	N	Y		
1976	BUTSO91E	133 E CE	17-Aug-90	Perimeter		1230673	752840	0				0	0.2	0	108	0		0		0		2137	0		1								



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic mg/kg Qual.	Cadmium mg/kg Qual.	Copper mg/kg Qual.	Lead mg/kg Qual.	Zinc mg/kg Qual.	pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
2013	BUTSO91E	1603 6TH	15-Aug-90	Bare Area		1226369	754318	0				0	0.2	0	54	0	0	280	0		1603 6TH STREET		Y	Y	R	Y	Y	
2014	BUTSO91E	618 W DA	06-Sep-90	Perimeter		1226730	754243	0				0	0.2	0	41	0	0	430	0		618 W DALY		Y	Y	R	N	Y	
2015	BUTSO91E	618 W DA	06-Sep-90	Bare Area		1226730	754243	0				0	0.2	0	54	0	0	3642	0		618 W DALY		Y	Y	R	Y	Y	
2016	BUTSO91E	506 W DA	23-Aug-90	Perimeter		1227246	754324	0				0	0.2	0	61	0	0	1254	0		506 W DALY		Y	Y	R	Y	Y	
2017	BUTSO91E	506 W DA	23-Aug-90	Play Area		1227246	754324	0				0	0.2	0	50	0	0	397	0		506 W DALY		Y	Y	R	N	Y	
2018	BUTSO91E	506 W DA	23-Aug-90	Garden		1227246	754324	0				0	0.2	0	72	0	0	641	0		506 W DALY		Y	Y	R	N	Y	
2019	BUTSO91E	506 W DA	23-Aug-90	Bare Area		1227246	754324	0				0	0.2	0	65	0	0	574	0		506 W DALY		Y	Y	R	N	Y	
2020	BUTSO91E	200 W DA	23-Aug-90	Perimeter		1228466	754558	0				0	0.2	0	49	0	0	1041	0		200 W DALY		Y	Y	R	N	Y	
2021	BUTSO91E	200 W DA	23-Aug-90	Play Area		1228466	754558	0				0	0.2	0	47	0	0	1042	0		200 W DALY		Y	Y	R	N	Y	
2022	BUTSO91E	200 W DA	23-Aug-90	Garden		1228466	754558	0				0	0.2	0	48	0	0	945	0		200 W DALY		Y	Y	R	N	Y	
2023	BUTSO91E	200 W DA	23-Aug-90	Bare Area		1228466	754558	0				0	0.2	0	52	0	0	1155	0		200 W DALY		Y	Y	R	Y	Y	
2024	BUTSO91E	427 TRAN	14-Aug-90	Perimeter		1227451	754249	0				0	0.2	0	71	0	0	1299	0		427 TRANSIT		Y	Y	R	N	Y	
2025	BUTSO91E	427 TRAN	14-Aug-90	Play Area		1227451	754249	0				0	0.2	0	49	0	0	596	0		427 TRANSIT		Y	Y	R	N	Y	
2026	BUTSO91E	427 TRAN	14-Aug-90	Garden		1227451	754249	0				0	0.2	0	77	0	0	886	0		427 TRANSIT		Y	Y	R	N	Y	
2027	BUTSO91E	427 TRAN	14-Aug-90	Bare Area		1227451	754249	0				0	0.2	0	88	0	0	2558	0		427 TRANSIT		Y	Y	R	Y	Y	
2028	BUTSO91E	421 NORT	27-Aug-90	Perimeter		1227365	754826	0				0	0.2	0	26	0	0	158	0		421 NORTH		Y	Y	R	N	Y	
2029	BUTSO91E	421 NORT	27-Aug-90	Play Area		1227365	754826	0				0	0.2	0	79	0	0	733	0		421 NORTH		Y	Y	R	Y	Y	
2030	BUTSO91E	421 NORT	27-Aug-90	Garden		1227365	754826	0				0	0.2	0	24	0	0	137	0		421 NORTH		Y	Y	R	N	Y	
2031	BUTSO91E	421 NORT	27-Aug-90	Bare Area		1227365	754826	0				0	0.2	0	44	0	0	356	0		421 NORTH		Y	Y	R	N	Y	
2032	BUTSO91E	24 E CEN	20-Aug-90	Perimeter		1229658	752895	0				0	0.2	0	71	0	0	2763	0		24 E CENTER		Y	Y	R	Y	Y	
2033	BUTSO91E	24 E CEN	20-Aug-90	Bare Area		1229658	752895	0				0	0.2	0	44	0	0	1857	0		24 E CENTER		Y	Y	R	N	Y	
2034	BUTSO91E	16 E CEN	22-Aug-90	Perimeter		1229552	752898	0				0	0.2	0	61	0	0	3991	0		16 E CENTER		Y	Y	R	Y	Y	
2035	BUTSO91E	16 E CEN	22-Aug-90	Play Area		1229552	752898	0				0	0.2	0	46	0	0	1175	0		16 E CENTER		Y	Y	R	N	Y	
2036	BUTSO91E	16 E CEN	22-Aug-90	Bare Area		1229552	752898	0				0	0.2	0	69	0	0	2763	0		16 E CENTER		Y	Y	R	N	Y	
2037	BUTSO91E	62 W DAL	15-Aug-90	Perimeter		1228859	754632	0				0	0.2	0	36	0	0	576	0		62 W DALY		Y	Y	R	N	Y	
2038	BUTSO91E	62 W DAL	15-Aug-90	Play Area		1228859	754632	0				0	0.2	0	39	0	0	236	0		62 W DALY		Y	Y	R	N	Y	
2039	BUTSO91E	62 W DAL	15-Aug-90	Garden		1228859	754632	0				0	0.2	0	48	0	0	851	0		62 W DALY		Y	Y	R	Y	Y	
2040	BUTSO91E	102 W DA	15-Aug-90	Perimeter		1228778	754620	0				0	0.2	0	53	0	0	1607	0		102 W DALY		Y	Y	R	N	Y	
2041	BUTSO91E	102 W DA	15-Aug-90	Play Area		1228778	754620	0				0	0.2	0	43	0	0	1314	0		102 W DALY		Y	Y	R	N	Y	
2042	BUTSO91E	102 W DA	15-Aug-90	Garden		1228778	754620	0				0	0.2	0	63	0	0	1965	0		102 W DALY		Y	Y	R	Y	Y	
2043	BUTSO91E	102 W DA	15-Aug-90	Bare Area		1228778	754620	0				0	0.2	0	82	0	0	1238	0		102 W DALY		Y	Y	R	N	Y	
2044	BUTSO91E	20 GLADS	14-Aug-90	Perimeter		1229993	754487	0				0	0.2	0	79	0	0	1662	0		20 GLADSTONE TERRAC		Y	Y	R	Y	Y	
2045	BUTSO91E	20 GLADS	14-Aug-90	Play Area		1229993	754487	0				0	0.2	0	48	0	0	987	0		20 GLADSTONE TERRAC		Y	Y	R	N	Y	
2046	BUTSO91E	20 GLADS	14-Aug-90	Garden		1229993	754487	0				0	0.2	0	52	0	0	1399	0		20 GLADSTONE TERRAC		Y	Y	R	N	Y	
2047	BUTSO91E	20 GLADS	14-Aug-90	Bare Area		1229993	754487	0				0	0.2	0	56	0	0	1422	0		20 GLADSTONE TERRAC		Y	Y	R	N	Y	
2048	BUTSO91E	4 GLADST		Perimeter		1229698	754445	0				0	0.2	0	93	0	0	938	0		4 GLADSTONE TERRACE		Y	Y	R	Y	Y	
2049	BUTSO91E	4 GLADST		Bare Area		1229698	754445	0				0	0.2	0	50	0	0	872	0		4 GLADSTONE TERRACE		Y	Y	R	N	Y	
2050	BUTSO91E	131 W DA	15-Aug-90	Perimeter		1228584	754761	0				0	0.2	0	55	0	0	136	0		131 W DALY		Y	Y	R	N	Y	
2051	BUTSO91E	131 W DA	15-Aug-90	Play Area		1228584	754761	0				0	0.2	0	40	0	0	825	0		131 W DALY		Y	Y	R	Y	Y	
2052	BUTSO91E	131 W DA	15-Aug-90	Bare Area		1228584	754761	0				0	0.2	0	36	0	0	492	0		131 W DALY		Y	Y	R	N	Y	
2053	BUTSO91E	43 W DAL	27-Aug-90	Perimeter		1229114	754852	0				0	0.2	0	58	0	0	671	0		43 W DALY		Y	Y	R	N	Y	
2054	BUTSO91E	43 W DAL	27-Aug-90	Bare Area		1229114	754852	0				0	0.2	0	65	0	0	859	0		43 W DALY		Y	Y	R	Y	Y	
2055	BUTSO91E	116 E DA	25-Aug-90	Perimeter		1229950	755062	0				0	0.2	0	69	0	0	1351	0		116 E DALY		Y	Y	R	Y	Y	
2056	BUTSO91E	116 E DA	25-Aug-90	Play Area		1229950	755062	0				0	0.2	0	51	0	0	962	0		116 E DALY		Y	Y	R	N	Y	
2057	BUTSO91E	144 E DA	23-Aug-90	Perimeter		1230215	755257	0				0	0.2	0	71	0	0	972	0		144 E DALY		Y	Y	R	N	Y	
2058	BUTSO91E	144 E DA	23-Aug-90	Garden		1230215	755257	0				0	0.2	0	96	0	0	1121	0		144 E DALY		Y	Y	R	Y	Y	
2059	BUTSO91E	144 E DA	23-Aug-90	Bare Area		1230215	755257	0				0	0.2	0	62	0	0	611	0		144 E DALY		Y	Y	R	N	Y	
2060	BUTSO91E	115 E CL	14-Aug-90	Perimeter		1229922	755558	0				0	0.2	0	62	0	0	1218	0		115 E CLARK ST		Y	Y	R	Y	Y	
2061	BUTSO91E	115 E CL	14-Aug-90	Play Area		1229922	755558	0				0	0.2	0	86	0	0	1139	0		115 E CLARK ST		Y	Y	R	N	Y	
2062	BUTSO91E	115 E CL	14-Aug-90	Garden		1229922	755558	0				0	0.2	0	86	0	0	782	0		115 E CLARK ST		Y	Y	R	N	Y	
2063	BUTSO91E	115 E CL	14-Aug-90	Bare Area		1229922	755558	0				0	0.2	0	74	0	0	831	0		115 E CLARK ST		Y	Y	R	N	Y	
2064	BUTSO91E	1619 N M	14-Aug-90	Perimeter		1229386	755111	0				0	0.2	0	61	0	0	1415	0		1619 N MAIN		N	Y	R	N	Y	
2065	BUTSO91E	1619 N M	14-Aug-90	Play Area		1229386	755111	0				0	0.2	0	53	0	0	1253	0		1619 N MAIN		N	Y	R	N	Y	
2066	BUTSO91E	1619 N M	14-Aug-90	Bare Area		1229386	755111	0				0	0.2	0	89	0	0	2028	0		1619 N MAIN		N	Y	R	Y	Y	
2067	BUTSO91E	1614 N M	30-Aug-90	Perimeter		1229567	755030	0				0	0.2	0	99	0	0	2357	0		1614 N MAIN		Y	Y	R	Y	Y	
2068	BUTSO91E	1614 N M	30-Aug-90	Play Area		1229567	755030	0				0	0.2	0	64	0	0	833	0		1614 N MAIN		Y	Y	R	N	Y	
2069	BUTSO91E	1614 N M	30-Aug-90	Bare Area		1229567	755030	0				0	0.2	0	77	0	0	1586	0		1614 N MAIN		Y	Y	R	N	Y	
2070	BUTSO91E	2809 S M	16-Aug-90	Perimeter		1227458	737030	0				0	0.2	0	61	0	0	197	0		2809 S MONTANA		Y	Y	R	Y	Y	
2071	BUTSO91E	2809 S M	16-Aug-90	Play Area		1227458	737030	0				0	0.2	0	28	0	0	46	0		2809 S MONTANA		Y	Y	R	N	Y	
2072	BUTSO91E	2809 S M	16-Aug-90	Bare Area		1227458	737030	0				0	0.2	0	54	0	0	108	0		2809 S MONTANA		Y	Y	R	N	Y	
2073	BUTSO91E	2805 S M	23-Aug-90	Perimeter		1227687	737467	0				0	0.2	0	66	0	0	255	0		2805 S MONTANA		Y					



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic		Cadmium		Copper		Lead		Zinc		pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
															mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual									
2088	BUTSO91E	138 CALH	16-Aug-90	Perimeter		1228580	735256	0				0	0.2	0	18	0		0		0	47	0			138 CALHOUN ST		Y	Y	R	N	Y		
2089	BUTSO91E	138 CALH	16-Aug-90	Play Area		1228580	735256	0				0	0.2	0	36	0		0		0	113	0			138 CALHOUN ST		Y	Y	R	N	Y		
2090	BUTSO91E	138 CALH	16-Aug-90	Bare Area		1228580	735256	0				0	0.2	0	13	0		0		0	36	0			138 CALHOUN ST		Y	Y	R	N	Y		
2091	BUTSO91E	135 CALH	16-Aug-90	Perimeter		1228887	735406	0				0	0.2	0	38	0		0		0	116	0			135 CALHOUN ST		Y	Y	R	N	Y		
2092	BUTSO91E	135 CALH	16-Aug-90	Play Area		1228887	735406	0				0	0.2	0	49	0		0		0	119	0			135 CALHOUN ST		Y	Y	R	N	Y		
2093	BUTSO91E	135 CALH	16-Aug-90	Garden		1228887	735406	0				0	0.2	0	31	0		0		0	89	0			135 CALHOUN ST		Y	Y	R	N	Y		
2094	BUTSO91E	135 CALH	16-Aug-90	Bare Area		1228887	735406	0				0	0.2	0	16	0		0		0	36	0			135 CALHOUN ST		Y	Y	R	N	Y		
2190	BUTSO91E	1118 FAR	22-Aug-90	Perimeter		1232165	745415	0				0	0.2	0	73	0		0		0	720	0			1118 FARRELL ST		Y	Y	R	N	Y		
2191	BUTSO91E	1118 FAR	22-Aug-90	Play Area		1232165	745415	0				0	0.2	0	73	0		0		0	13	0			1118 FARRELL ST		Y	Y	R	N	Y		
2192	BUTSO91E	1208 FAR	17-Aug-90	Perimeter		1232475	745408	0				0	0.2	0	96	0		0		0	703	0			1208 FARRELL ST		Y	Y	R	N	Y		
2193	BUTSO91E	1208 FAR	17-Aug-90	Play Area		1232475	745408	0				0	0.2	0	72	0		0		0	475	0			1208 FARRELL ST		Y	Y	R	N	Y		
2194	BUTSO91E	1208 FAR	17-Aug-90	Bare Area		1232475	745408	0				0	0.2	0	84	0		0		0	677	0			1208 FARRELL ST		Y	Y	R	N	Y		
2195	BUTSO91E	1226 FAR	17-Aug-90	Perimeter		1232616	745404	0				0	0.2	0	78	0		0		0	969	0			1226 FARRELL ST		Y	Y	R	N	Y		
2196	BUTSO91E	1226 FAR	17-Aug-90	Play Area		1232616	745404	0				0	0.2	0	85	0		0		0	920	0			1226 FARRELL ST		Y	Y	R	N	Y		
2197	BUTSO91E	1226 FAR	17-Aug-90	Garden		1232616	745404	0				0	0.2	0	87	0		0		0	751	0			1226 FARRELL ST		Y	Y	R	N	Y		
2198	BUTSO91E	1106 SEC	17-Aug-90	Perimeter		1232064	745712	0				0	0.2	0	91	0		0		0	2612	0			1106 SECOND ST		Y	Y	R	N	Y		
2199	BUTSO91E	1106 SEC	17-Aug-90	Play Area		1232064	745712	0				0	0.2	0	296	0		0		0	1463	0			1106 SECOND ST		Y	Y	R	N	Y		
2200	BUTSO91E	1106 SEC	17-Aug-90	Bare Area		1232064	745712	0				0	0.2	0	103	0		0		0	2460	0			1106 SECOND ST		Y	Y	R	N	Y		
2201	BUTSO91E	1118 SEC	24-Aug-90	Perimeter		1232198	745708	0				0	0.2	0	97	0		0		0	1307	0			1118 SECOND ST		Y	Y	R	N	Y		
2202	BUTSO91E	1118 SEC	24-Aug-90	Garden		1232198	745708	0				0	0.2	0	64	0		0		0	604	0			1118 SECOND ST		Y	Y	R	N	Y		
2203	BUTSO91E	1118 SEC	24-Aug-90	Bare Area		1232198	745708	0				0	0.2	0	95	0		0		0	1197	0			1118 SECOND ST		Y	Y	R	N	Y		
2204	BUTSO91E	1115 SEC	29-Aug-90	Perimeter		1232166	745882	0				0	0.2	0	124	0		0		0	710	0			1115 SECOND ST		N	Y	R	N	Y		
2205	BUTSO91E	1115 SEC	29-Aug-90	Play Area		1232166	745882	0				0	0.2	0	97	0		0		0	954	0			1115 SECOND ST		N	Y	R	N	Y		
2206	BUTSO91E	1115 SEC	29-Aug-90	Bare Area		1232166	745882	0				0	0.2	0	151	0		0		0	1031	0			1115 SECOND ST		N	Y	R	N	Y		
2207	BUTSO91E	1131 THI	21-Aug-90	Perimeter		1232167	746140	0				0	0.2	0	80	0		0		0	1098	0			1131 THIRD ST		N	Y	R	N	Y		
2208	BUTSO91E	1131 THI	21-Aug-90	Play Area		1232167	746140	0				0	0.2	0	4	0		0		0	28	0			1131 THIRD ST		N	Y	R	N	Y		
2209	BUTSO91E	1131 THI	21-Aug-90	Bare Area		1232167	746140	0				0	0.2	0	47	0		0		0	842	0			1131 THIRD ST		N	Y	R	N	Y		
2210	BUTSO91E	1246 SHO	23-Aug-90	Perimeter		1232680	746133	0				0	0.2	0	86	0		0		0	830	0			1246 SHORT ST		Y	Y	R	N	Y		
2211	BUTSO91E	1246 SHO	23-Aug-90	Play Area		1232680	746133	0				0	0.2	0	82	0		0		0	584	0			1246 SHORT ST		Y	Y	R	N	Y		
2212	BUTSO91E	920 ERGO	16-Aug-90	Perimeter		1232720	746048	0				0	0.2	0	71	0		0		0	1074	0			920 ERGO ST		N	Y	R	N	Y		
2213	BUTSO91E	920 ERGO	16-Aug-90	Play Area		1232720	746048	0				0	0.2	0	48	0		0		0	175	0			920 ERGO ST		N	Y	R	N	Y		
2214	BUTSO91E	920 ERGO	16-Aug-90	Garden		1232720	746048	0				0	0.2	0	65	0		0		0	524	0			920 ERGO ST		N	Y	R	N	Y		
2215	BUTSO91E	920 ERGO	16-Aug-90	Bare Area		1232720	746048	0				0	0.2	0	59	0		0		0	342	0			920 ERGO ST		N	Y	R	N	Y		
2216	BUTSO91E	1246 SHO	06-Sep-90	Perimeter		1232680	746133	0				0	0.2	0	103	0		0		0	1213	0			1246 SHORT ST		Y	Y	R	N	Y		
2217	BUTSO91E	1246 SHO	06-Sep-90	Play Area		1232680	746133	0				0	0.2	0	97	0		0		0	767	0			1246 SHORT ST		Y	Y	R	N	Y		
2218	BUTSO91E	1246 SHO	06-Sep-90	Bare Area		1232680	746133	0				0	0.2	0	145	0		0		0	1379	0			1246 SHORT ST		Y	Y	R	N	Y		
2219	BSBLP	11	05-Dec-95	1201		1227853	750245	0		S001866		0	0.08	0	0	0		0		0	986	0			210 W Woolman ST		N	Y	R	N	Y		
2220	BSBLP	11	05-Dec-95	1202		1227853	750245	0		S001867		0	0.08	0	0	0		0		0	11600	0			210 W Woolman ST		N	Y	R	N	Y		
2221	BSBLP	13	05-Jun-97	37001		1230410	744587	0		7-1471		0	0.0																				



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic mg/kg Qual	Cadmium mg/kg Qual	Copper mg/kg Qual	Lead mg/kg Qual	Zinc mg/kg Qual	pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
2258	BSBLP	21	09-Jul-96	4		1229774	751279	0		S002326		0	0.08	0	32	0	0	1560	0		109 Belle ST	STORMWATER SEDIMENT	N	Y	Y	N	Y	
2259	BSBLP	22	19-Sep-96	29001		1228670	752929	0		S003224		0	0.08	0	0	0	0	989	0		36 W Center ST		N	Y	Y	N	Y	
2260	BSBLP	22	19-Sep-96	29002		1228670	752929	0		S003225		0	0.08	0	0	0	0	1360	0		36 W Center ST		N	Y	Y	N	Y	
2261	BSBLP	22	19-Sep-96	29003		1228670	752929	0		S003226		0	0.08	0	0	0	0	2970	0		36 W Center ST		N	Y	Y	N	Y	
2262	BSBLP	22	19-Sep-96	29004		1228670	752929	0		S003227		0	0.08	0	0	0	0	906	0		36 W Center ST		N	Y	Y	N	Y	
2263	BSBLP	23	16-Jul-96	16001		1228895	752791	0		S002386		0	0.08	0	0	0	0	1930	0		31 Missoula AVE		N	Y	Y	N	Y	
2264	BSBLP	23	16-Jul-96	16002		1228895	752791	0		S002387		0	0.08	0	0	0	0	3990	0		31 Missoula AVE		N	Y	Y	N	Y	
2265	BSBLP	23	16-Jul-96	16003		1228895	752791	0		S002388		0	0.08	0	0	0	0	1650	0		31 Missoula AVE		N	Y	Y	N	Y	
2266	BSBLP	24	27-Sep-96	30001		1228146	754499	0		6-1450		0	0.08	0	25	0	150	517	978		246 W Daly ST		N	Y	Y	N	Y	
2267	BSBLP	24	27-Sep-96	30002		1228146	754499	0		6-1451		0	0.08	0	59	4	368	2840	3540		246 W Daly ST		N	Y	Y	N	Y	
2268	BSBLP	24	27-Sep-96	30003		1228146	754499	0		6-1452		0	0.08	0	0	5	225	2620	3540		246 W Daly ST		N	Y	Y	N	Y	
2269	BSBLP	25	09-Aug-96	25001		1229386	755111	0		S002553		0	0.08	0	0	0	0	2300	0		1619 N Main ST		N	Y	Y	N	Y	
2270	BSBLP	25	09-Aug-96	25002		1229386	755111	0		S002554		0	0.08	0	0	0	0	1800	0		1619 N Main ST		N	Y	Y	N	Y	
2271	BSBLP	25	09-Aug-96	25003		1229386	755111	0		S002555		0	0.08	0	0	0	0	956	0		1619 N Main ST		N	Y	Y	N	Y	
2272	BSBLP	25	09-Aug-96	25004		1229386	755111	0		S002556		0	0.08	0	0	0	0	956	0		1619 N Main ST		N	Y	Y	N	Y	
2273	BSBLP	25	09-Aug-96	25005		1229386	755111	0		S002557		0	0.08	0	0	0	0	988	0		1619 N Main ST		N	Y	Y	N	Y	
2274	BSBLP	25	09-Aug-96	25006		1229386	755111	0		S002558		0	0.08	0	0	0	0	1370	0		1619 N Main ST		N	Y	Y	N	Y	
2275	BSBLP	25	09-Aug-96	25007		1229386	755111	0		S002559		0	0.08	0	0	0	0	178	0		1619 N Main ST		N	Y	Y	N	Y	
2276	BSBLP	25	09-Aug-96	25008		1229386	755111	0		S002560		0	0.08	0	0	0	0	748	0		1619 N Main ST		N	Y	Y	N	Y	
2281	BSBLP	41	25-Oct-95	4001		1230032	744343	0		S001746		0	0.08	0	0	0	0	744	0		1039 Maryland AVE		Y	Y	Y	N	Y	
2292	BSBLP	41	25-Oct-95	4002		1230032	744343	0		S001749		0	0.08	0	0	0	0	893	0		1039 Maryland AVE	Basement	Y	Y	Y	N	Y	
2293	BSBLP	41	25-Oct-95	4003		1230032	744343	0		S001750		0	0.08	0	0	0	0	610	0		1039 Maryland AVE		Y	Y	Y	N	Y	
2294	BSBLP	41	25-Oct-95	4004		1230032	744343	0		S001751		0	0.08	0	0	0	0	714	0		1039 Maryland AVE	SOUTH SIDE	Y	Y	Y	N	Y	
2295	BSBLP	41	25-Oct-95	4005		1230032	744343	0		S001752		0	0.08	0	0	0	0	1050	0		1039 Maryland AVE	NORTH SIDE	Y	Y	Y	N	Y	
2296	BSBLP	42	17-Aug-95	3001		1226053	749398	0		S000746		0	0.08	0	0	0	0	856	0		315 N Alabama ST		Y	Y	Y	N	Y	
2297	BSBLP	42	17-Aug-95	3002		1226053	749398	0		S000747		0	0.08	0	0	0	0	2740	0		315 N Alabama ST		Y	Y	Y	N	Y	
2298	BSBLP	42	17-Aug-95	3003		1226053	749398	0		S000748		0	0.08	0	0	0	0	286	0		315 N Alabama ST		Y	Y	Y	N	Y	
2299	BSBLP	42	17-Aug-95	3004		1226053	749398	0		S000749		0	0.08	0	0	0	0	412	0		315 N Alabama ST		Y	Y	Y	N	Y	
2300	BSBLP	42	17-Aug-95	3005		1226053	749398	0		S000750		0	0.08	0	0	0	0	502	0		315 N Alabama ST		Y	Y	Y	N	Y	
2301	BSBLP	42	17-Aug-95	3006		1226053	749398	0		S000751		0	0.08	0	0	0	0	521	0		315 N Alabama ST		Y	Y	Y	N	Y	
2302	BSBLP	42	17-Aug-95	3007		1226053	749398	0		S000752		0	0.08	0	0	0	0	876	0		315 N Alabama ST		Y	Y	Y	N	Y	
2303	BSBLP	43	09-Jul-96	13001		1228706	739674	0		S002327		0	0.08	0	0	0	0	270	0		2433 S Colorado ST		Y	Y	Y	N	Y	
2304	BSBLP	43	09-Jul-96	13002		1228706	739674	0		S002328		0	0.08	0	0	0	0	2920	0		2433 S Colorado ST	Driveway	Y	Y	Y	N	Y	
2305	BSBLP	43	09-Jul-96	13003		1228706	739674	0		S002329		0	0.08	0	0	0	0	346	0		2433 S Colorado ST		Y	Y	Y	N	Y	
2306	BSBLP	43	09-Jul-96	13004		1228706	739674	0		S002330		0	0.08	0	0	0	0	2430	0		2433 S Colorado ST		Y	Y	Y	N	Y	
2307	BSBLP	43	09-Jul-96	13005		1228706	739674	0		S002331		0	0.08	0	0	0	0	1430	0		2433 S Colorado ST		Y	Y	Y	N	Y	
2308	BSBLP	43	09-Jul-96	13006		1228706	739674	0		S002332		0	0.08	0	0	0	0	1560	0		2433 S Colorado ST		Y	Y	Y	N	Y	
2309	BSBLP	43	09-Jul-96	13007		1228706	739674	0		S002333		0	0.08	0	0	0	0	1640	0		2433 S Colorado ST		Y	Y	Y	N	Y	
2310	BSBLP	43	09-Jul-96	13008		1228706	739674	0		S002334		0	0.08	0	0	0	0	173	0		2433 S Colorado ST		Y	Y	Y	N	Y	
2311	BSBLP	43	09-Jul-96	13009		1228706	739674	0		S002335		0	0.08	0	0	0	0	50	0		2433 S Colorado ST		Y	Y	Y	N	Y	
2321	BSBLP	47	09-Jul-96	14001		1225401	750348	0		S002336		0	0.08	0	0	0	0	720	0		918 Antimony ST		Y	Y	Y	N	Y	
2322	BSBLP	47	09-Jul-96	14002		1225401	750348	0		S002337		0	0.08	0	0	0	0	2910	0		918 Antimony ST		Y	Y	Y	N	Y	
2323	BSBLP	47	09-Jul-96	14003		1225401	750348	0		S002338		0	0.08	0	0	0	0	1160	0		918 Antimony ST		Y	Y	Y	N	Y	
2324	BSBLP	47	09-Jul-96	14004		1225401	750348	0		S002339		0	0.08	0	0	0	0	817	0		918 Antimony ST		Y	Y	Y	N	Y	
2325	BSBLP	47	09-Jul-96	14005		1225401	750348	0		S002340		0	0.08	0	0	0	0	734	0		918 Antimony ST		Y	Y	Y	N	Y	
2326	BSBLP	47	09-Jul-96	14006		1225401	750348	0		S002341		0	0.08	0	0	0	0	516	0		918 Antimony ST		Y	Y	Y	N	Y	
2327	BSBLP	48	03-Nov-93	1		1231423	744823	0		S6180		0	0.08	0	0	0	0	1230	0		1111 S Arizona ST		Y	Y	Y	N	Y	
2328	BSBLP	51	21-Aug-96	27001		1229748	753226	0		S002673		0	0.08	0	0	0	0	774	0		8 Bennett ST		Y	Y	Y	N	Y	
2329	BSBLP	51	21-Aug-96	27002		1229748	753226	0		S002674		0	0.08	0	0	0	0	723	0		8 Bennett ST		Y	Y	Y	N	Y	
2330	BSBLP	51	21-Aug-96	27003		1229748	753226	0		S002675		0	0.08	0	0	0	0	2490	0		8 Bennett ST		Y	Y	Y	N	Y	
2331	BSBLP	51	21-Aug-96	27004		1229748	753226	0		S002676		0	0.08	0	0	0	0	5570	0		8 Bennett ST		Y	Y	Y	N	Y	
2332	BSBLP	51	21-Aug-96	27005		1229748	753226	0		S002677		0	0.08	0	0	0	0	2000	0		8 Bennett ST		Y	Y	Y	N	Y	
2333	BSBLP	51	21-Aug-96	27006		1229748	753226	0		S002678		0	0.08	0	0	0	0	2060	0		8 Bennett ST		Y	Y	Y	N	Y	
2334	BSBLP	51	21-Aug-96	27007		1229748	753226	0		S002679		0	0.08	0	0	0	0	2500	0		8 Bennett ST		Y	Y	Y	N	Y	
2335	BSBLP	51	14-May-99	27008		1229748	753226	0		9-0169		0	0.08	0	0	0	0	1320	0		8 Bennett ST		Y	Y	Y	N	Y	
2336	BSBLP	52	09-Sep-96	28001		1230660	753248	0		S002915		0	0.08	0	0	0	0	692	0		77 Bennett ST		Y	Y	Y	N	Y	
2337	BSBLP	52	09-Sep-96	28002		1230660	753248	0		S002916		0	0.08	0	0	0	0	223	0		77 Bennett ST		Y	Y	Y	N	Y	
2338	BSBLP	52	09-Sep-96	28003		1230660	753248	0		S002917		0	0.08	0	0	0	0	426	0		77 Bennett ST	PATIO	Y	Y	Y	N	Y	
2339	BSBLP	52	09-Sep-96	28004		1230660	753248	0		S002918		0	0.08	0	0	0	0	560	0		77 Bennett ST		Y	Y	Y	N	Y	
2340																												



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic		Cadmium		Copper		Lead		Zinc		pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
															mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual									
2356	BSBLP	68	14-Jul-97	042001		1229967	754691	0		S008117		0	0.08	0	41	0	0	0	398	0				1516 Clayton AVE		Y	Y	R	N	Y			
2357	BSBLP	68	14-Jul-97	042002		1229967	754691	0		S008118		0	0.08	0	34	0	0	0	807	0				1516 Clayton AVE		Y	Y	R	N	Y			
2358	BSBLP	68	14-Jul-97	042003		1229967	754691	0		S008119		0	0.08	0	37	0	0	0	1290	0				1516 Clayton AVE		Y	Y	R	Y	Y			
2359	BSBLP	68	14-Jul-97	042004		1229967	754691	0		S008120		0	0.08	0	51	0	0	0	1210	0				1516 Clayton AVE		Y	Y	R	N	Y			
2360	BSBLP	68	14-Jul-97	042005		1229967	754691	0		S008121		0	0.08	0	39	0	0	0	384	0				1516 Clayton AVE		Y	Y	R	N	Y			
2361	BSBLP	68	31-Jul-98	12501		1229967	754691	0		S009134		0	0.08	0	39	0	0	0	989	0				1516 Clayton AVE		Y	Y	R	N	Y			
2362	BSBLP	68	31-Jul-98	12502		1229967	754691	0		S009134		0	0.08	0	40	0	0	0	520	0				1516 Clayton AVE		Y	Y	R	N	Y			
2363	BSBLP	68	22-Sep-98	12503		1229967	754691	0		6-0680		0	0.08	0	0	0	0	0	870	0				1516 Clayton AVE	SLOPE RE-SAMPLED PER	Y	Y	R	N	Y			
2364	BSBLP	68	22-Sep-98	12504		1229967	754691	0		6-0681		0	0.08	0	0	0	0	0	939	0				1516 Clayton AVE	NORTH HALF RE-SAMPLE	Y	Y	R	N	Y			
2365	BSBLP	70	18-Nov-92	1		1228870	744148	0				0	0.08	0	0	0	0	0	2100	0				1003 S Colorado ST	Yard	Y	Y	R	Y	Y			
2366	BSBLP	71	09-Jul-96	13001		1228706	739674	0		S002327		0	0.08	0	0	0	0	0	270	0				2432 S Colorado ST		Y	Y	R	N	Y			
2367	BSBLP	71	09-Jul-96	13002		1228706	739674	0		S002328		0	0.08	0	0	0	0	0	2920	0				2432 S Colorado ST		Y	Y	R	Y	Y			
2368	BSBLP	71	09-Jul-96	13003		1228706	739674	0		S002329		0	0.08	0	0	0	0	0	346	0				2432 S Colorado ST		Y	Y	R	N	Y			
2369	BSBLP	71	09-Jul-96	13004		1228706	739674	0		S002330		0	0.08	0	0	0	0	0	2430	0				2432 S Colorado ST		Y	Y	R	N	Y			
2370	BSBLP	71	09-Jul-96	13005		1228706	739674	0		S002331		0	0.08	0	0	0	0	0	1430	0				2432 S Colorado ST		Y	Y	R	N	Y			
2371	BSBLP	71	09-Jul-96	13006		1228706	739674	0		S002332		0	0.08	0	0	0	0	0	1560	0				2432 S Colorado ST		Y	Y	R	N	Y			
2372	BSBLP	71	09-Jul-96	13007		1228706	739674	0		S002333		0	0.08	0	0	0	0	0	1640	0				2432 S Colorado ST		Y	Y	R	N	Y			
2373	BSBLP	71	09-Jul-96	13008		1228706	739674	0		S002334		0	0.08	0	0	0	0	0	173	0				2432 S Colorado ST		Y	Y	R	N	Y			
2374	BSBLP	71	09-Jul-96	13009		1228706	739674	0		S002335		0	0.08	0	0	0	0	0	50	0				2432 S Colorado ST		Y	Y	R	N	Y			
2375	BSBLP	72	09-Mar-93	8001		1228389	749623	0		S001761		0	0.08	0	0	0	0	0	694	0				118 W Copper ST		N	Y	R	N	Y			
2376	BSBLP	72	09-Mar-93	8002		1228389	749623	0		S001762		0	0.08	0	0	0	0	0	1160	0				118 W Copper ST		N	Y	R	Y	Y			
2377	BSBLP	73	13-Nov-95	1		1224680	749826	0				0	0.08	0	0	0	0	0	312	0				915 W Copper ST		Y	Y	R	N	Y			
2378	BSBLP	73	13-Nov-95	6		1224680	749826	0				0	0.08	0	0	0	0	0	5540	0				915 W Copper ST		Y	Y	R	Y	Y			
2379	BSBLP	74	13-Nov-95	1		1225487	749511	0		S001761		0	0.08	0	0	0	0	0	312	0				918 W Copper ST		Y	Y	R	N	Y			
2380	BSBLP	74	13-Nov-95	2		1225487	749511	0		S001762		0	0.08	0	0	0	0	0	5540	0				918 W Copper ST		Y	Y	R	Y	Y			
2381	BSBLP	76	12-May-93	1		1228718	746083	0				0	0.08	0	0	0	0	0	661	0				832 S Dakota ST	location unknown	Y	Y	R	Y	Y			
2382	BSBLP	78	19-Jul-96	23001		1228778	754620	0		S002430		0	0.08	0	0	0	0	0	7970	0				102 W Daly ST		Y	Y	R	Y	Y			
2383	BSBLP	78	19-Jul-96	23002		1228778	754620	0		S002431		0	0.08	0	0	0	0	0	1190	0				102 W Daly ST		Y	Y	R	N	Y			
2384	BSBLP	78	19-Jul-96	23003		1228778	754620	0		S002432		0	0.08	0	0	0	0	0	703	0				102 W Daly ST		Y	Y	R	N	Y			
2385	BSBLP	78	19-Jul-96	23004		1228778	754620	0		S002433		0	0.08	0	0	0	0	0	905	0				102 W Daly ST		Y	Y	R	N	Y			
2386	BSBLP	79	29-Jul-97	44001		1228243	754518	0		7-1769		0	0.08	0	0	0	0	0	219	0				240 W Daly ST		Y	Y	R	N	Y			
2387	BSBLP	79	29-Jul-97	44002		1228243	754518	0		7-1770		0	0.08	0	0	0	0	0	566	0				240 W Daly ST		Y	Y	R	N	Y			
2388	BSBLP	79	29-Jul-97	44003		1228243	754518	0		7-1771		0	0.08	0	0	0	0	0	3310	0				240 W Daly ST	SOUTH EAST YARD	Y	Y	R	Y	Y			
2389	BSBLP	79	29-Jul-97	44004		1228243	754518	0		7-1772		0	0.08	0	0	0	0	0	893	0				240 W Daly ST		Y	Y	R	N	Y			
2390	BSBLP	79	29-Jul-97	44005		1228243	754518	0		7-1773		0	0.08	0	0	0	0	0	64	0				240 W Daly ST		Y	Y	R	N	Y			
2391	BSBLP	79	29-Jul-97	44006		1228243	754518	0		7-1774		0	0.08	0	0	0	0	0	1450	0				240 W Daly ST		Y	Y	R	N	Y			
2392	BSBLP	79	29-Jul-97	44007		1228243	754518	0		7-1775		0	0.08	0	0	0	0	0	164	0				240 W Daly ST		Y	Y	R	N	Y			
2393	BSBLP	79	06-Aug-99	44008		1228243	754518	0		9-0664		0	0.08	0	22	0	0	0	96	0				240 W Daly ST		Y	Y	R	N	Y			
2394	BSBLP																																



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic		Cadmium		Copper		Lead		Zinc		pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
															mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.									
2435	BSBLP	112	21-Jul-97	43001		1229426	744448	0		S008166		0	0.08	0	0	0	0	0	680	0					936 S Iowa AVE		Y	Y		R	N	Y	
2436	BSBLP	112	21-Jul-97	43002		1229426	744448	0		S008167		0	0.08	0	0	0	0	0	744	0					936 S Iowa AVE		Y	Y		R	N	Y	
2437	BSBLP	112	21-Jul-97	43003		1229426	744448	0		S008168		0	0.08	0	0	0	0	0	1330	0					936 S Iowa AVE		Y	Y		R	N	Y	
2438	BSBLP	112	21-Jul-97	43004		1229426	744448	0		S008169		0	0.08	0	0	0	0	0	639	0					936 S Iowa AVE		Y	Y		R	N	Y	
2439	BSBLP	112	21-Jul-97	43005		1229426	744448	0		S008170		0	0.08	0	0	0	0	0	1470	0					936 S Iowa AVE		Y	Y		R	Y	Y	
2440	BSBLP	112	21-Jul-97	43006		1229426	744448	0		S008171		0	0.08	0	0	0	0	0	575	0					936 S Iowa AVE		Y	Y		R	N	Y	
2441	BSBLP	116	18-Jul-96	22001		1228987	753174	0		S002425		0	0.08	0	0	0	0	0	1130	0					19 W LaPlatta ST		Y	Y		R	N	Y	
2442	BSBLP	116	18-Jul-96	22002		1228987	753174	0		S002426		0	0.08	0	0	0	0	0	2800	0					19 W LaPlatta ST		Y	Y		R	Y	Y	
2443	BSBLP	116	18-Jul-96	22003		1228987	753174	0		S002427		0	0.08	0	0	0	0	0	1430	0					19 W LaPlatta ST		Y	Y		R	N	Y	
2444	BSBLP	116	18-Jul-96	22004		1228987	753174	0		S002428		0	0.08	0	0	0	0	0	780	0					19 W LaPlatta ST		Y	Y		R	N	Y	
2445	BSBLP	116	18-Jul-96	22005		1228987	753174	0		S002429		0	0.08	0	0	0	0	0	1390	0					19 W LaPlatta ST		Y	Y		R	N	Y	
2446	BSBLP	117	16-Jul-96	17001		1228865	753191	0		S002389		0	0.08	0	0	0	0	0	340	0					27 W LaPlatta ST		Y	Y		R	N	Y	
2447	BSBLP	117	16-Jul-96	17002		1228865	753191	0		S002390		0	0.08	0	0	0	0	0	147	0					27 W LaPlatta ST		Y	Y		R	N	Y	
2448	BSBLP	117	16-Jul-96	17003		1228865	753191	0		S002391		0	0.08	0	0	0	0	0	352	0					27 W LaPlatta ST		Y	Y		R	Y	Y	
2449	BSBLP	118	16-Jul-96	18001		1229787	753031	0		S002392		0	0.08	0	0	0	0	0	1190	0					35 E LaPlatta ST		Y	Y		R	Y	Y	
2450	BSBLP	118	16-Jul-96	18002		1229787	753031	0		S002393		0	0.08	0	0	0	0	0	1120	0					35 E LaPlatta ST		Y	Y		R	N	Y	
2451	BSBLP	118	16-Jul-96	18003		1229787	753031	0		S002394		0	0.08	0	0	0	0	0	891	0					35 E LaPlatta ST		Y	Y		R	N	Y	
2452	BSBLP	121	28-Jul-92	1		1228986	739489	0				0	0.08	0	0	0	0	0	246	0					2501 S Main ST		Y	Y		R	N	Y	
2453	BSBLP	121	28-Jul-92	2		1228986	739489	0				0	0.08	0	0	0	0	0	429	0					2501 S Main ST		Y	Y		R	Y	Y	
2454	BSBLP	121	28-Jul-92	3		1228986	739489	0				0	0.08	0	0	0	0	0	164	0					2501 S Main ST		Y	Y		R	N	Y	
2455	BSBLP	126	13-Aug-96	26001		1228002	750361	0		S002561		0	0.08	0	0	0	0	0	870	0					521 N Montana ST		Y	Y		R	N	Y	
2456	BSBLP	126	13-Aug-96	26002		1228002	750361	0		S002562		0	0.08	0	0	0	0	0	1780	0					521 N Montana ST		Y	Y		R	N	Y	
2457	BSBLP	126	13-Aug-96	26003		1228002	750361	0		S002563		0	0.08	0	0	0	0	0	330	0					521 N Montana ST		Y	Y		R	N	Y	
2458	BSBLP	126	13-Aug-96	26004		1228002	750361	0		S002564		0	0.08	0	0	0	0	0	2230	0					521 N Montana ST		Y	Y		R	Y	Y	
2459	BSBLP	126	13-Aug-96	26005		1228002	750361	0		S002565		0	0.08	0	0	0	0	0	530	0					521 N Montana ST		Y	Y		R	N	Y	
2460	BSBLP	127	13-Oct-97	50001		1227979	750919	0		S008425		0	0.08	0	0	0	0	0	724	0					711 1/2 N Montana ST		Y	Y		R	Y	Y	
2461	BSBLP	127	13-Oct-97	50002		1227979	750919	0		S008426		0	0.08	0	0	0	0	0	577	0					711 1/2 N Montana ST		Y	Y		R	N	Y	
2462	BSBLP	127	13-Oct-97	50003		1227979	750919	0		S008427		0	0.08	0	0	0	0	0	454	0					711 1/2 N Montana ST		Y	Y		R	N	Y	
2463	BSBLP	127	13-Oct-97	50004		1227979	750919	0		S008428		0	0.08	0	0	0	0	0	474	0					711 1/2 N Montana ST		Y	Y		R	N	Y	
2464	BSBLP	127	13-Oct-97	50005		1227979	750919	0		S008429		0	0.08	0	0	0	0	0	262	0					711 1/2 N Montana ST		Y	Y		R	N	Y	
2465	BSBLP	127	14-May-99	17700		1227979	750919	0		9-0170		0	0.08	0	0	0	0	0	263	0					711 1/2 N Montana ST	N LOT W HALF	Y	Y		R	N	Y	
2466	BSBLP	127	14-May-99	17701		1227979	750919	0		9-0171		0	0.08	0	0	0	0	0	121	0					711 1/2 N Montana ST	N LOT E HALF	Y	Y		R	N	Y	
2467	BSBLP	127	14-May-99	17702		1227979	750919	0		9-0172		0	0.08	0	0	0	0	0	366	0					711 1/2 N Montana ST		Y	Y		R	N	Y	
2468	BSBLP	127	14-May-99	17703		1227979	750919	0		9-0173		0	0.08	0	0	0	0	0	513	0					711 1/2 N Montana ST	E LOT W HALF	Y	Y		R	N	Y	
2469	BSBLP	127	14-May-99	17704		1227979	750919	0		9-0174		0	0.08	0	0	0	0	0	285	0					711 1/2 N Montana ST	E LOT E HALF	Y	Y		R	N	Y	
2470	BSBLP	129	24-Jul-92	1		1230698	753333	0				0	0.08	0	0	0	0	0	605	0					114 O'Neill ST		Y	Y		R	Y	Y	
2471	BSBLP	129	24-Jul-92	2		1230698	753333	0				0	0.08	0	0	0	0	0	415	0													



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic		Cadmium		Copper		Lead		Zinc		pH	Location	Convenient	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
															mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual									
2512	BSBLP	163	13-Aug-98	11604		1226437	746142	0		S009333		0	0.08	0	0	0	0	0	498		0			640 S CLARK ST		N	Y	R	N	Y			
2513	BSBLP	163	13-Aug-98	11605		1226437	746142	0		S009334		0	0.08	0	0	0	0	1650		0			640 S CLARK ST		N	Y	R	N	Y				
2514	BSBLP	163	13-Aug-98	11606		1226437	746142	0		S009335		0	0.08	0	0	0	0	770		0			640 S CLARK ST		N	Y	R	N	Y				
2515	BSBLP	164	12-Nov-97	53001		1232474	745921	0		S008625		0	0.08	0	112		448		2610		3020				SOUTH EAST YARD	N	Y	R	Y	Y			
2516	BSBLP	164	12-Nov-97	53002		1232474	745921	0		S008626		0	0.08	0	115		0		617		2350		3760			NORTH EAST YARD	N	Y	R	N	Y		
2517	BSBLP	164	12-Nov-97	53003		1232474	745921	0		S008627		0	0.08	0	112		0		575		2350		3760				N	Y	R	N	Y		
2518	BSBLP	165	01-Oct-97	49001		1224701	748902	0		S008396		0	0.08	0	0	0	0	656		0					115 S EMMETT ST		Y	Y	R	Y	Y		
2519	BSBLP	165	01-Oct-97	49002		1224701	748902	0		S008397		0	0.08	0	0	0	0	275		0					115 S EMMETT ST		Y	Y	R	N	Y		
2520	BSBLP	165	01-Oct-97	49003		1224701	748902	0		S008398		0	0.08	0	0	0	0	156		0					115 S EMMETT ST		Y	Y	R	N	Y		
2521	BSBLP	165	01-Oct-97	49004		1224701	748902	0		S008399		0	0.08	0	0	0	0	160		0					115 S EMMETT ST		Y	Y	R	N	Y		
2522	BSBLP	165	01-Oct-97	49005		1224701	748902	0		S008400		0	0.08	0	0	0	0	383		0					115 S EMMETT ST	EAST BLVD	Y	Y	R	N	Y		
2525	BSBLP	167	25-Oct-95	04001		1230032	744343	0		S001748		0	0.08	0	0	0	0	744		0					1039 MARYLAND AVE		Y	Y	R	N	Y		
2526	BSBLP	167	25-Oct-95	04002		1230032	744343	0		S001749		0	0.08	0	0	0	0	893		0					1039 MARYLAND AVE		Y	Y	R	N	Y		
2527	BSBLP	167	25-Oct-95	04003		1230032	744343	0		S001750		0	0.08	0	0	0	0	610		0					1039 MARYLAND AVE		Y	Y	R	N	Y		
2528	BSBLP	167	25-Oct-95	04004		1230032	744343	0		S001751		0	0.08	0	0	0	0	714		0					1039 MARYLAND AVE	SOUTH WEST YARD	Y	Y	R	N	Y		
2529	BSBLP	167	25-Oct-95	04005		1230032	744343	0		S001752		0	0.08	0	0	0	0	1050		0					1039 MARYLAND AVE	SOUTH WEST YARD	Y	Y	R	Y	Y		
2532	BSBLP	180	20-Apr-98	70001		1226233	749094	0		S008845		0	0.08	0	0	0	0	923		0					730/732 W GRANITE ST		Y	Y	R	N	Y		
2533	BSBLP	180	20-Apr-98	70002		1226233	749094	0		S008846		0	0.08	0	0	0	0	2470		0					730/732 W GRANITE ST		Y	Y	R	Y	Y		
2534	BSBLP	181	07-Dec-95	01101		1227149	749231	0		S001888		0	0.08	0	0	0	0	498		0					217 N JACKSON AVE		Y	Y	R	N	Y		
2535	BSBLP	181	07-Dec-95	01102		1227149	749231	0		S001889		0	0.08	0	0	0	0	617		0					217 N JACKSON AVE		Y	Y	R	Y	Y		
2536	BSBLP	182	19-Aug-92	1		1225734	749385	0				0	0.08	0	0	0	0	1800		0					849 W QUARTZ ST		Y	Y	R	Y	Y		
2537	BSBLP	182	19-Aug-92	2		1225734	749385	0				0	0.08	0	0	0	0	1120		0					849 W QUARTZ ST		Y	Y	R	N	Y		
2538	BSBLP	183	10-Oct-96	1		1225713	749227	0		S003308		0	0.08	0	0	0	0	527		0					850 W QUARTZ ST	SANDBOX	Y	Y	R	Y	Y		
2539	BSBLP	184	13-Aug-98	012801		1225162	753468	0		S009341		0	0.08	0	0	0	0	332		0					1005 17TH ST	N OF RETAINING WALL	Y	Y	R	N	Y		
2540	BSBLP	184	13-Aug-98	012802		1225162	753468	0		S009342		0	0.08	0	0	0	0	1050		0					1005 17TH ST	WASH BACK PORCH	Y	Y	R	Y	Y		
2541	BSBLP	185	29-Jul-98	012401		1229502	753389	0		S009127		0	0.08	0	21		0	634		0					7 BENNETT ST		Y	Y	R	Y	Y		
2542	BSBLP	185	29-Jul-98	012402		1229502	753389	0		S009128		0	0.08	0	30		0	520		0					7 BENNETT ST		Y	Y	R	N	Y		
2543	BSBLP	185	29-Jul-98	012403		1229502	753389	0		S009129		0	0.08	0	32		0	547		0					7 BENNETT ST		Y	Y	R	N	Y		
2544	BSBLP	185	29-Jul-98	012404		1229502	753389	0		S009130		0	0.08	0	37		0	527		0					7 BENNETT ST		Y	Y	R	N	Y		
2545	BSBLP	186	21-Jul-98	012101		1225584	749677	0		S009121		0	0.08	0	40		0	800		0					903 W COPPER ST		Y	Y	R	Y	Y		
2546	BSBLP	187	19-Oct-98	015200		1228407	747764	0		8-0817		0	0.08	0	0	0	0	719		0					213 S DAKOTA ST		N	Y	R	N	Y		
2547	BSBLP	187	19-Oct-98	015201		1228407	747764	0		8-0818		0	0.08	0	0	0	0	885		0					213 S DAKOTA ST	DRIVEWAY	N	Y	R	N	Y		
2548	BSBLP	187	19-Oct-98	015202		1228407	747764	0		8-0819		0	0.08	0	0	0	0	1290		0					213 S DAKOTA ST	SW OF SHED	N	Y	R	Y	Y		
2549	BSBLP	187	19-Oct-98	015203		1228407	747764	0		8-0820		0	0.08	0	0	0	0	285		0					213 S DAKOTA ST		N	Y	R	N	Y		
2552	BSBLP	189	29-Apr-97	032001		1229366	744802	0		7-1388		0	0.08	0	56		7	935		0					858 S MAIN ST	NORTH WEST	Y	Y	R	N	Y		
2553	BSBLP	189	29-Apr-97	032002		1229366	744802	0		7-1389		0	0.08	0	37		8	1870		0					858 S MAIN ST	SOUTH WEST	Y	Y	R	N	Y		
2554	BSBLP	189	29-Apr-97	032003		1229366	744802	0		7-1390		0	0.08	0	57		11	2450		0					858 S MAIN ST		Y	Y	R	N	Y		
2555	BSBLP	189	29-Apr-97	032004		1229366	744802	0		7-1391		0	0.0																				



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic mg/kg	Cadmium mg/kg	Copper mg/kg	Lead mg/kg	Zinc mg/kg	pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
2594	BSBLP	207	01-Sep-98	13300		1229566	752735	0		S009470		0	0.08	0	0	0	0	1110	0		101 MULLEN ST	PLAY AREA	Y	Y	Y	R	Y	Y
2595	BSBLP	208	29-Sep-98	14200		1229850	745758	0		8-0682		0	0.08	0	0	0	666	0	0		723 NEVADA AVE	SOIL AT RETAINING WA	Y	Y	Y	R	N	Y
2596	BSBLP	208	29-Sep-98	14201		1229850	745758	0		8-0683		0	0.08	0	0	0	829	0	0		723 NEVADA AVE	DRIVEWAY	Y	Y	Y	R	Y	Y
2597	BSBLP	208	29-Sep-98	14202		1229850	745758	0		8-0684		0	0.08	0	0	0	583	0	0		723 NEVADA AVE	WEST HALF VACANT LOT	Y	Y	Y	R	N	Y
2598	BSBLP	208	29-Sep-98	14203		1229850	745758	0		8-0685		0	0.08	0	0	0	762	0	0		723 NEVADA AVE	EAST HALF VACANT LOT	Y	Y	Y	R	N	Y
2599	BSBLP	213	26-Mar-99	16300		1227366	750436	0		9-0076		0	0.08	0	0	0	259	0	0		410 VIRGINIA ST	BASKETBALL COURT	Y	Y	Y	R	N	Y
2600	BSBLP	213	26-Mar-99	16301		1227366	750436	0		9-0077		0	0.08	0	0	0	710	0	0		410 VIRGINIA ST	RR BED BEHIND HOUSE	Y	Y	Y	R	Y	Y
2602	BSBLP	215	14-May-99	17400		1229864	752763	0		9-0166		0	0.08	0	0	0	443	0	0		35 WELLS ST		Y	Y	Y	R	Y	Y
2603	BSBLP	216	17-Jun-99	18000		1227270	749105	0		9-0225		0	0.08	0	0	0	656	0	0		415 W GRANITE ST		Y	Y	Y	R	Y	Y
2604	BSBLP	216	17-Jun-99	18001		1227270	749105	0		9-0226		0	0.08	0	0	0	386	0	0		415 W GRANITE ST		Y	Y	Y	R	N	Y
2605	BSBLP	216	17-Jun-99	18002		1227270	749105	0		9-0227		0	0.08	0	0	0	278	0	0		415 W GRANITE ST		Y	Y	Y	R	N	Y
2606	BSBLP	217	15-Jul-99	11701		1227868	749898	0		S009074		0	0.08	0	0	0	788	0	0		455 N IDAHO ST		Y	Y	Y	R	Y	Y
2607	BSBLP	217	15-Jul-99	11702		1227868	749898	0		S009075		0	0.08	0	0	0	545	0	0		455 N IDAHO ST		Y	Y	Y	R	N	Y
2608	BSBLP	218	14-May-99	16800		1229394	745534	0		9-0164		0	0.08	0	0	0	1000	0	0		722 S MAIN ST		Y	Y	Y	R	Y	Y
2609	BSBLP	218	14-May-99	16801		1229394	745534	0		9-0165		0	0.08	0	0	0	624	0	0		722 S MAIN ST		Y	Y	Y	R	N	Y
2610	BSBLP	218	14-May-99	16802		1229394	745534	0		9-0168		0	0.08	0	0	0	606	0	0		722 S MAIN ST		Y	Y	Y	R	N	Y
2611	BSBLP	219	14-May-99	17200		1229186	744808	0		9-0167		0	0.08	0	0	0	315	0	0				Y	Y	Y	R	Y	Y
2612	BSBLP	221	03-Dec-98	15700		1229198	745771	0		8-0918		0	0.08	0	0	0	402	0	0		671 S MAIN ST		Y	Y	Y	R	Y	Y
2613	BSBLP	222	03-Dec-98	15400		1228139	752698	0		8-0912		0	0.08	0	0	0	551	0	0		107 MISSOULA ST		Y	Y	Y	R	Y	Y
2614	BSBLP	223	23-Apr-98	75001		1230725	744649	0		S008866		0	0.08	0	0	0	791	0	0		1042 NEVADA AVE		Y	Y	Y	R	N	Y
2615	BSBLP	223	23-Apr-98	75002		1230725	744649	0		S008869		0	0.08	0	0	0	1790	0	0		1042 NEVADA AVE	GARAGE PERIMETER	Y	Y	Y	R	N	Y
2616	BSBLP	223	23-Apr-98	75003		1230725	744649	0		S008870		0	0.08	0	0	0	448	0	0		1042 NEVADA AVE		Y	Y	Y	R	N	Y
2617	BSBLP	223	23-Apr-98	75004		1230725	744649	0		S008871		0	0.08	0	0	0	1240	0	0		1042 NEVADA AVE	SOUTH WEST YARD	Y	Y	Y	R	N	Y
2618	BSBLP	223	23-Apr-98	75005		1230725	744649	0		S008872		0	0.08	0	0	0	1310	0	0		1042 NEVADA AVE	NORTH WEST YARD	Y	Y	Y	R	N	Y
2619	BSBLP	223	23-Apr-98	75006		1230725	744649	0		S008873		0	0.08	0	0	0	2930	0	0		1042 NEVADA AVE		Y	Y	Y	R	Y	Y
2620	BSBLP	224	30-Mar-99	16400		1232166	745882	0		9-0101		0	0.08	0	0	0	987	0	0		1115 E SECOND ST		N	Y	Y	R	Y	Y
2621	BSBLP	224	30-Mar-99	16401		1232166	745882	0		9-0102		0	0.08	0	0	0	883	0	0		1115 E SECOND ST		N	Y	Y	R	N	Y
2622	BSBLP	224	30-Mar-99	16402		1232166	745882	0		9-0103		0	0.08	0	0	0	942	0	0		1115 E SECOND ST		N	Y	Y	R	N	Y
2623	BSBLP	225	22-Mar-99	16000		1227786	750534	0		9-0062		0	0.08	0	0	0	627	0	0		223 VIRGINIA ST		Y	Y	Y	R	Y	Y
2624	BSBLP	227	14-May-99	17100		1231074	744625	0		9-0159		0	0.08	0	0	0	114	0	0		1112 S WYOMING ST	SAND BOX	Y	Y	Y	R	N	Y
2625	BSBLP	227	14-May-99	17101		1231074	744625	0		9-0160		0	0.08	0	0	0	761	0	0		1112 S WYOMING ST	SOUTH EAST YARD	Y	Y	Y	R	Y	Y
2626	BSBLP	229	17-May-99	17600		1226526	748241	0		9-0191		0	0.08	0	0	0	462	0	0		631/633 W GALENA ST	LOWER EAST YARD	Y	Y	Y	R	Y	Y
2627	BSBLP	229	17-May-99	17601		1226526	748241	0		9-0192		0	0.08	0	0	0	256	0	0		631/633 W GALENA ST	UPPER EAST YARD	Y	Y	Y	R	N	Y
2628	BSBLP	230	17-Apr-98	62001		1233043	745426	0		S008819		0	0.08	0	0	0	2790	0	0		1042 GAYLORD ST		Y	Y	Y	R	Y	Y
2629	BSBLP	230	17-Apr-98	62002		1233043	745426	0		S008820		0	0.08	0	0	0	927	0	0		1042 GAYLORD ST		Y	Y	Y	R	N	Y
2630	BSBLP	230	17-Apr-98	62003		1233043	745426	0		S008821		0	0.08	0	0	0	1290	0	0		1042 GAYLORD ST		Y	Y	Y	R	N	Y
2631	BSBLP	230	17-Apr-98	62004		1233043	745426	0		S008822		0	0.08	0	0	0	764	0	0		1042 GAYLORD ST		Y	Y	Y	R	N	Y
2632	BSBLP	230	17-Apr-98	62005		1233043	745426	0		S008823		0	0.08	0	0	0	1230	0	0		1042 GAYLORD ST		Y	Y	Y	R	N	Y
2633	BSBLP	230	17-Apr-98	62006		1233043	745426	0		S008824		0	0.08	0	0	0	1280	0	0		1042 GAYLORD ST		Y	Y	Y	R	N	Y
2634	BSBLP	231	22-Oct-98	15000		1227096	748927	0		8-0028		0	0.08	0	0	0	663	0	0		512/514 W GRANITE ST		Y	Y	Y	R	Y	Y
2635	BSBLP	231	22-Oct-98	15001		1227096	748927	0		8-0029		0	0.08	0	0	0	557	0	0		512/514 W GRANITE ST		Y	Y	Y	R	N	Y
2636	BSBLP	231	03-Dec-98	15002		1227096	748927	0		8-0911		0	0.08	0	0	0	343	0	0		512/514 W GRANITE ST	514 W GRANITE	Y	Y	Y	R	N	Y
2637	BSBLP	233	01-Sep-98	13400		1229587	752629	0		S009471		0	0.08	0	0	0	1220	0	0		106 MULLEN ST		Y	Y	Y	R	N	Y
2638	BSBLP	233	01-Sep-98	13401		1229587	752629	0		S009472		0	0.08	0	0	0	2930	0	0		106 MULLEN ST		Y	Y	Y	R	Y	Y
2639	BSBLP	234	25-Sep-98	14300		1230257	745070	0		8-0686		0	0.08	0	0	0	565	0	0		917 NEVADA AVE		Y	Y	Y	R	N	Y
2640	BSBLP	234	25-Sep-98	14301		1230257	745070	0		8-0687		0	0.08	0	0	0	849	0	0		917 NEVADA AVE		Y	Y	Y	R	Y	Y
2641	BSBLP	237	20-Jul-98	12001		1228398	745924	0		S009090		0	0.08	0	0	0	523	0	0		653 PLACER ST		Y	Y	Y	R	Y	Y
2642	BSBLP	237	20-Jul-98	12002		1228398	745924	0		S009091		0	0.08	0	0	0	254	0	0		653 PLACER ST		Y	Y	Y	R	N	Y
2643	BSBLP	237	20-Jul-98	12003		1228398	745924	0		S009092		0	0.08	0	0	0	457	0	0		653 PLACER ST		Y	Y	Y	R	N	Y
2644	BSBLP	238	01-Sep-98	13500		1228277	743824	0		S009473		0	0.08	0	0	0	2340	0	0		1037 PLACER ST		Y	Y	Y	R	Y	Y
2645	BSBLP	238	01-Sep-98	13501		1228277	743824	0		S009474		0	0.08	0	0	0	423	0	0		1037 PLACER ST	DRIVEWAY	Y	Y	Y	R	N	Y
2646	BSBLP	241	16-Sep-98	14000		1227834	750367	0		S009630		0	0.08	0	0	0	6520	0	0		211 WOOLMAN ST		Y	Y	Y	R	Y	Y
2647	BSBLP	241	16-Sep-98	14001		1227834	750367	0		S009631		0	0.08	0	0	0	858	0	0		211 WOOLMAN ST	DRIVEWAY	Y	Y	Y	R	N	Y
2648	BSBLP	243	01-Jul-99	19600		1230649	744409	0		999432		0	0.08	0	53	0	440	0	0		1105 NEVADA AVE		Y	Y	Y	R	Y	Y
2649	BSBLP	244	06-Jul-99	20100		1227204	747925	0		999432		0	0.08	0	0	0	548	0	0		431 W MERCURY ST		Y	Y	Y	R	Y	Y
2650	BSBLP	246	02-Jul-99	19500		1226610	754405	0		9-0269		0	0.08	0	39	0	176	0	0		625 W DALY ST		Y	Y	Y	R	N	Y
2651	BSBLP	246	02-Jul-99	19501		1226610	754405																					



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															mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.									
2670	BSBLP	252	28-Jul-99	20504		1228042	754481	0			0	0.08	0	0	0	0	0	0	1260	0				308 W DALY ST		Y	Y	R	N	Y			
2671	BSBLP	252	22-Jul-99	20500		1228042	754481	0			0	0.08	0	0	0	0	0	1150	0				308 W DALY ST		Y	Y	R	N	Y				
2672	BSBLP	252	22-Jul-99	20501		1228042	754481	0			0	0.08	0	7	0	0	0	1110	0				308 W DALY ST		Y	Y	R	N	Y				
2673	BSBLP	252	22-Jul-99	20502		1228042	754481	0			0	0.08	0	0	0	0	0	1490	0				308 W DALY ST		Y	Y	R	Y	Y				
2674	BSBLP	252	22-Jul-99	20503		1228042	754481	0			0	0.08	0	11	0	0	0	500	0				308 W DALY ST	EARTHEN BSMT	Y	Y	R	N	Y				
2675	BSBLP	253	13-Aug-98	12801		1225162	753468	0			0	0.08	0	61	0	0	0	332	0				1005 17TH ST	N. of Ref. Wall	Y	Y	R	N	Y				
2676	BSBLP	253	13-Aug-98	12802		1225162	753468	0			0	0.08	0	294	0	0	0	1050	0				1005 17TH ST	Back porch	Y	Y	R	Y	Y				
2677	BSBLP	256	14-May-99	17000		1226074	751035	0			0	0.08	0	0	0	0	0	448	0				609 WAUKESHA ST		Y	Y	R	Y	Y				
2678	BSBLP	256	14-May-99	17001		1226074	751035	0			0	0.08	0	0	0	0	0	319	0				609 WAUKESHA ST		Y	Y	R	N	Y				
2679	BSBLP	263	20-Jul-99	20200		1226115	751703	0			0	0.08	0	0	0	0	0	296	0				804 ZARELDA ST		Y	Y	R	Y	Y				
2680	BSBLP	267	20-Jul-99	20200		1226115	751703	0			0	0.08	0	0	0	0	0	296	0				804 ZARELDA ST		Y	Y	R	Y	Y				
2681	BSBLP	269	02-Jun-99	19300		1228470	750496	0		9-0249	0	0.08	0	36	0	0	0	523	0				617 N ALASKA AVE		Y	Y	R	Y	Y				
2682	BSBLP	269	02-Jun-99	19301		1228470	750496	0		9-0250	0	0.08	0	35	0	0	303	0	0				617 N ALASKA AVE	SOUTH DRIVE	Y	Y	R	N	Y				
2683	BSBLP	270	04-Aug-99	21100		1227618	749881	0		9-0668	0	0.08	0	0	0	0	0	495	0				412 N WASHINGTON ST		Y	Y	R	Y	Y				
2684	BSBLP	270	04-Aug-99	21101		1227618	749881	0		9-0669	0	0.08	0	0	0	0	0	443	0				412 N WASHINGTON ST	WEST BLVD	Y	Y	R	N	Y				
2685	BSBLP	271	19-Jul-99	20400		1229918	750657	0		9-0360	0	0.08	0	74	0	0	0	244	0				708 N WYOMING ST		Y	Y	R	N	Y				
2686	BSBLP	271	19-Jul-99	20401		1229918	750657	0		9-0361	0	0.08	0	29	0	0	0	558	0				708 N WYOMING ST	SOUTH EAST YARD	Y	Y	R	Y	Y				
2687	BSBLP	271	19-Jul-99	20402		1229918	750657	0		9-0362	0	0.08	0	50	0	0	0	487	0				708 N WYOMING ST	OUTSIDE FENCE	Y	Y	R	N	Y				
2688	BSBLP	271	19-Jul-99	20403		1229918	750657	0		9-0363	0	0.08	0	25	0	0	0	503	0				708 N WYOMING ST		Y	Y	R	N	Y				
2689	BSBLP	271	19-Jul-99	20404		1229918	750657	0		9-0364	0	0.08	0	22	0	0	0	350	0				708 N WYOMING ST	BEHIND HOUSE	Y	Y	R	N	Y				
2690	BSBLP	272	01-Jul-99	19700		1228636	754770	0		9-0274	0	0.08	0	218	0	0	0	5790	0				127 W DALY ST	CLOSET ATTIC	Y	Y	R	N	Y				
2691	BSBLP	272	01-Jul-99	19701		1228636	754770	0		9-0275	0	0.08	0	6	0	0	0	385	0				127 W DALY ST		Y	Y	R	N	Y				
2692	BSBLP	272	20-Jul-99	19702		1228636	754770	0		9-0365	0	0.08	0	360	0	0	0	6730	0				127 W DALY ST	FRONT ATTIC	Y	Y	R	Y	Y				
2693	BSBLP	273	06-Jul-99	20000		1228186	754691	0		9-0279	0	0.08	0	34	0	0	0	2770	0				221 W DALY ST		Y	Y	R	Y	Y				
2694	BSBLP	274	04-Sep-97	48001		1226052	749339	0		8318	0	0.08	0	0	0	0	0	1870	0				301 N ALABAMA ST		Y	Y	R	N	Y				
2695	BSBLP	274	04-Sep-97	48002		1226052	749339	0		8319	0	0.08	0	0	0	0	0	906	0				301 N ALABAMA ST	WEST GARDEN	Y	Y	R	N	Y				
2696	BSBLP	274	04-Sep-97	48003		1226052	749339	0		8320	0	0.08	0	0	0	0	0	1980	0				301 N ALABAMA ST		Y	Y	R	Y	Y				
2697	BSBLP	274	04-Sep-97	48004		1226052	749339	0		8321	0	0.08	0	0	0	0	0	341	0				301 N ALABAMA ST		Y	Y	R	N	Y				
2698	BSBLP	275	14-Jul-93	1		1227043	750152	0		S5178	0	0.08	0	0	0	0	0	1380	0				542 N FRANKLIN ST	LOCATION UNKNOWN	Y	Y	R	Y	Y				
2699	BSBLP	276	03-Aug-93	1		1225703	749385	0		S5383	0	0.08	0	0	0	0	0	811	0				855 W QUARTZ ST		N	Y	R	N	Y				
2700	BSBLP	276	03-Aug-93	2		1225703	749385	0		S5384	0	0.08	0	0	0	0	0	1430	0				855 W QUARTZ ST		N	Y	R	Y	Y				
2701	BSBLP	277	25-Aug-98	13200		1229404	753297	0		S009406	0	0.08	0	225	0	0	0	33300	0				4 BENNETT ST	INCLUDING DRIVE	N	Y	R	Y	Y				
2702	BSBLP	277	25-Aug-98	13201		1229404	753297	0		S009407	0	0.08	0	35	0	0	0	458	0				4 BENNETT ST	VACANT LOT	N	Y	R	N	Y				
2703	BSBLP	277	14-Dec-98	13202		1229404	753297	0		S013202	0	0.08	0	0	0	0	0	218	0				4 BENNETT ST	EAST YARD/VACANT LOT	N	Y	R	N	Y				
2704	BSBLP	277	14-Dec-98	13203		1229404	753297	0		S013203	0	0.08	0	0	0	0	0	4660	0				4 BENNETT ST	MINUS DRIVEWAY	N	Y	R	N	Y				
2705	BSBLP	278	01-Sep-99	21300		1229033	754021	0		9-1027	0	0.08	0	0	0	0	0	1480	0				1406 B ST		Y	Y	R	Y	Y				
2706	BSBLP	279	01-Sep-99	21600		1228730	735251	0		9-1031	0	0.08	0	0	0	0	0	40	0				130 CALHOUN ST		Y	Y	R	Y	Y				
2707	BSBLP	279	01-Sep-99	21601		1228730	735251	0		9-1032	0	0.08	0	0	0	0	0	33	0				130 CALHOUN ST		Y	Y	R	N	Y				
2708	BSBLP	280	01-Sep-99	21700		1228409	749773	0		9-1037	0	0.08	0	0	0</																		



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic		Cadmium		Copper		Lead		Zinc		pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
															mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.									
2750	BSBLP	297	03-Jun-97	38004		1232790	745280	0	7-1482		0	0.08	0	0	0	0	0	0	1930	0				1249 E 1ST ST		Y	Y	R	N	Y			
2751	BSBLP	297	03-Jun-97	38005		1232790	745280	0	7-1483		0	0.08	0	0	0	0	0	735	0					1249 E 1ST ST		Y	Y	R	N	Y			
2752	BSBLP	297	03-Jun-97	38006		1232790	745280	0	7-1484		0	0.08	0	0	0	0	0	2900	0					1249 E 1ST ST		Y	Y	R	Y	Y			
2753	BSBLP	297	03-Jun-97	38007		1232790	745280	0	7-1485		0	0.08	0	0	0	0	0	1100	0					1249 E 1ST ST		Y	Y	R	N	Y			
2754	BSBLP	297	03-Jun-97	38008		1232790	745280	0	7-1486		0	0.08	0	0	0	0	0	1550	0					1249 E 1ST ST		Y	Y	R	N	Y			
2755	BSBLP	298	07-May-98	10001		1227548	745161	0	S008922		0	0.08	0	0	0	0	0	2100	0					806 S WASHINGTO ST		N	Y	R	Y	Y			
2756	BSBLP	298	07-May-98	10002		1227548	745161	0	S008923		0	0.08	0	0	0	0	0	1470	0					806 S WASHINGTON ST		N	Y	R	N	Y			
2757	BSBLP	298	07-May-98	10003		1227548	745161	0	S008924		0	0.08	0	0	0	0	0	144	0					806 S WASHINGTON ST	VACANT LOT	N	Y	R	N	Y			
2758	BSBLP	298	22-Oct-98	10004		1227548	745161	0	8-0813		0	0.08	0	0	0	0	0	224	0					806 S WASHINGTON ST		N	Y	R	N	Y			
2759	BSBLP	298	22-Oct-98	10005		1227548	745161	0	8-0814		0	0.08	0	0	0	0	0	155	0					806 S WASHINGTON ST		N	Y	R	N	Y			
2760	BSBLP	298	03-Dec-98	10006		1227548	745161	0	8-0913		0	0.08	0	0	0	0	0	1180	0					806 S WASHINGTON ST		N	Y	R	N	Y			
2761	BSBLP	300	16-Oct-98	14800		1227127	748353	0	8-0824		0	0.08	0	0	0	0	0	1020	0					504/506 W PARK ST		Y	Y	R	Y	Y			
2762	BSBLP	300	16-Oct-98	14801		1227127	748353	0	8-0825		0	0.08	0	0	0	0	0	221	0					504/506 W PARK ST	WEST LOT (506 W PARK	Y	Y	R	N	Y			
2763	BSBLP	301	25-Aug-98	13100		1226804	754580	0	S009400		0	0.08	0	90	0	0	0	2620	0					600 N NORTH ST	"W VACANT LOT, E MID	N	Y	R	N	Y			
2764	BSBLP	301	25-Aug-98	13101		1226804	754580	0	S009401		0	0.08	0	80	0	0	0	2710	0					600 N NORTH ST	"W VACANT LOT, W MID	N	Y	R	N	Y			
2765	BSBLP	301	25-Aug-98	13102		1226804	754580	0	S009402		0	0.08	0	44	0	0	0	4050	0					600 N NORTH ST	"W VACANT LOT, W EDG	N	Y	R	Y	Y			
2766	BSBLP	301	25-Aug-98	13103		1226804	754580	0	S009403		0	0.08	0	42	0	0	0	1620	0					600 N NORTH ST	"W VACANT LOT, W COR	N	Y	R	N	Y			
2767	BSBLP	301	25-Aug-98	13104		1226804	754580	0	S009404		0	0.08	0	56	0	0	0	2140	0					600 N NORTH ST	"W VACANT LOT, S EDG	N	Y	R	N	Y			
2768	BSBLP	301	25-Aug-98	13105		1226804	754580	0	S009405		0	0.08	0	94	0	0	0	576	0					600 N NORTH ST	"W VACANT LOT, E SID	N	Y	R	N	Y			
2769	BSBLP	301	29-Mar-99	13106		1226804	754580	0	9-0078		0	0.08	0	0	0	0	0	328	0					600 N NORTH ST		N	Y	R	N	Y			
2770	BSBLP	301	29-Mar-99	13107		1226804	754580	0	9-0079		0	0.08	0	0	0	0	0	372	0					600 N NORTH ST		N	Y	R	N	Y			
2771	BSBLP	301	29-Mar-99	13108		1226804	754580	0	9-0080		0	0.08	0	0	0	0	0	223	0					600 N NORTH ST		N	Y	R	N	Y			
2772	BSBLP	301	29-Mar-99	13109		1226804	754580	0	9-0081		0	0.08	0	0	0	0	0	292	0					600 N NORTH ST		N	Y	R	N	Y			
2773	BSBLP	302	30-Apr-98	99001		1229367	755224	0	8-0182		0	0.08	0	23	0	0	0	1480	0					1629 N MAIN ST		N	Y	R	N	Y			
2774	BSBLP	302	30-Apr-98	99002		1229367	755224	0	8-0183		0	0.08	0	20	0	0	0	1980	0					1629 N MAIN ST		N	Y	R	Y	Y			
2775	BSBLP	302	30-Apr-98	99003		1229367	755224	0	8-0184		0	0.08	0	43	0	0	0	1320	0					1629 N MAIN ST		N	Y	R	N	Y			
2776	BSBLP	302	30-Apr-98	99004		1229367	755224	0	8-0185		0	0.08	0	8	0	0	0	1420	0					1629 N MAIN ST		N	Y	R	N	Y			
2777	BSBLP	303	20-Apr-99	16700		1228353	747823	0	9-0116		0	0.08	0	0	0	0	0	474	0					144 W MERCURY ST		Y	Y	R	Y	Y			
2778	BSBLP	304	15-Sep-99	22000		1230183	755220	0	9-1356		0	0.08	0	12	0	0	0	342	0					140 E DALY ST		Y	Y	R	N	Y			
2779	BSBLP	304	15-Sep-99	22001		1230183	755220	0	9-1357		0	0.08	0	31	0	0	0	322	0					140 E DALY ST		Y	Y	R	N	Y			
2780	BSBLP	304	15-Sep-99	22002		1230183	755220	0	9-1358		0	0.08	0	22	0	0	0	213	0					140 E DALY ST		Y	Y	R	N	Y			
2781	BSBLP	304	15-Sep-99	22003		1230183	755220	0	9-1359		0	0.08	0	63	0	0	0	422	0					140 E DALY ST	ATTIC	Y	Y	R	Y	Y			
2782	BSBLP	305	16-Sep-99	22100		1228761	749768	0	9-1360		0	0.08	0	0	0	0	0	874	0					29 W COPPER ST		Y	Y	R	Y	Y			
2783	BSBLP	318	28-Jul-99	20700		1228917	753049	0	9-0498		0	0.08	0	23	0	0	0	645	0					21 W CENTER ST		N	Y	R	N	Y			
2784	BSBLP	318	28-Jul-99	20701		1228917	753049	0	9-0499		0	0.08	0	9	0	0	0	1440	0					21 W CENTER ST		N	Y	R	N	Y			
2785	BSBLP	318	28-Jul-99	20702		1228917	753049	0	9-0500		0	0.08	0	32	0	0	0	1450	0					21 W CENTER ST		N	Y	R	Y	Y			
2786	BSBLP	318	28-Jul-99	20703		1228917	753049	0	9-0501		0	0.08	0	52	0	0	0	1050	0					21 W CENTER ST		N	Y	R	N	Y			
2787	BSBLP	319	11-Jun-99	17900		1228306	749775	0	9-0220		0	0.08	0	0	0	0	0																



## BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measure-ment Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic mg/kg Qual.	Cadmium mg/kg Qual.	Copper mg/kg Qual.	Lead mg/kg Qual.	Zinc mg/kg Qual.	pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
2825	BSBLP	326	22-Oct-98	14701		1228377	749502	0		8-0622		0	0.08	0	0	0	0	1090	0		115 W QUARTZ ST		N	Y	R	N	Y	
2826	BSBLP	326	22-Oct-98	14702		1228377	749502	0		8-0623		0	0.08	0	0	0	0	1990	0		115 W QUARTZ ST		N	Y	R	Y	Y	
2827	BSBLP	327	11-Dec-98	15600		1227853	750535	0		8-0917		0	0.08	0	0	0	0	2380	0		217 W VIRGINIA ST	NORTH YARD/DRIVE	N	Y	R	Y	Y	
2828	BSBLP	328	05-Oct-98	14400		1227732	750534	0		8-0673		0	0.08	0	0	0	0	580	0		305 W VIRGINIA ST	VACANT LOT WEST END	N	Y	R	N	Y	
2829	BSBLP	328	05-Oct-98	14401		1227732	750534	0		8-0674		0	0.08	0	0	0	0	219	0		305 W VIRGINIA ST	VACANT LOT EAST END	N	Y	R	N	Y	
2830	BSBLP	328	05-Oct-98	14402		1227732	750534	0		8-0675		0	0.08	0	0	0	0	87	0		305 W VIRGINIA ST	PILE AT VACANT LOT	N	Y	R	N	Y	
2831	BSBLP	328	05-Oct-98	14403		1227732	750534	0		8-0676		0	0.08	0	0	0	0	772	0		305 W VIRGINIA ST	LOWER PORTION	N	Y	R	N	Y	
2832	BSBLP	328	05-Oct-98	14404		1227732	750534	0		8-0677		0	0.08	0	0	0	0	1430	0		305 W VIRGINIA ST	UPPER PORTION	N	Y	R	N	Y	
2833	BSBLP	328	05-Oct-98	14405		1227732	750534	0		8-0678		0	0.08	0	0	0	0	2260	0		305 W VIRGINIA ST		N	Y	R	Y	Y	
2834	BSBLP	329	10-Jul-98	11501		1227376	746649	0		S009067		0	0.08	0	45	0	0	2050	0		505 S WASHINGTON ST		N	Y	R	Y	Y	
2835	BSBLP	329	10-Jul-98	11502		1227376	746649	0		S009068		0	0.08	0	52	0	0	1440	0		505 S WASHINGTON ST	GARAGE PERIMETER	N	Y	R	N	Y	
2836	BSBLP	329	10-Jul-98	11503		1227376	746649	0		S009069		0	0.08	0	45	0	0	841	0		505 S WASHINGTON ST		N	Y	R	N	Y	
2837	BSBLP	329	10-Jul-98	11504		1227376	746649	0		S009070		0	0.08	0	56	0	0	1130	0		505 S WASHINGTON ST		N	Y	R	N	Y	
2838	BSBLP	329	10-Jul-98	11505		1227376	746649	0		S009071		0	0.08	0	27	0	0	1030	0		505 S WASHINGTON ST		N	Y	R	N	Y	
1511	BUTSO95A	FSUA-11	23-Oct-95	119712040	DRY	1229610	753114	0			FD	0	0.17	4	35	0	664	5050	9380	3.7	South of 19 Caplatta		U	N	Y	N	Y	
2550	BSBLP	188	07-Jul-98	011301		0	0	0		S009054		0	0.08	0	0	0	0	1090	0		745 S MAIN ST		Y	Y	R	N	Y	
2551	BSBLP	188	07-Jul-98	011302		0	0	0		S009055		0	0.08	0	0	0	0	7150	0		745 S MAIN ST		Y	Y	R	Y	Y	
1492	BUTSD89A	SD-187	11-Aug-89	01		1227148	742419	0	8-86696	MHT985		0	0.1	0	76	20	886	1330	3160				N	Y	N	Y	Y	
1493	BUTSD89A	SD-187	11-Aug-89	01		1227148	742419	0				0	0.1	0	63	11	249	987	1558				N	Y	N	N	N	
542	BUTSO87A	RY-108	13-Jul-87	A	DRY	1227220	750358	5856	MHJ 977	MHJ 977	FD	0	0.08	3	56	7	346	900	1860	8.15	*503 W Woolman, BUT		Y	Y	R	Y	Y	
562	BUTSO87A	RY-127	16-Jul-87	A	DRY	1223346	741081	5496	MHR 023	MHR 023	FD	0	0.08	3	101	6	156	172	560	8.14	* Vienna St., WILLIA		Y	Y	R	Y	Y	
652	BUTSO87A	VG-016	16-Jul-87	A	DRY	1223408	741104	5497	MHR 030	MHR 030	FD	0	0.5	3	51	2	154	139	689	7.72	* Vienna St., Willia	*0-6" SAMPLE FROM V	Y	Y	R	Y	Y	
447	BUTSO87A	RY-009	16-Jun-87	A	DRY	1228810	746120	5589	MHH 697	MHH 697	FD	0	0.08	3	58	8	240	897	1370	7.39	*623 S Colorado, BU		Y	Y	R	Y	Y	
637	BUTSO87A	VG-002	16-Jun-87	A	DRY	1228830	746143	5591	MHH 692	MHH 692	FD	0	0.5	3	79	6	145	415	723	8.06	*623 S Colorado, Bu	*0-6" SAMPLE FROM V	Y	Y	R	Y	Y	
N/A	BUTSO93B	MLW-47	08-Jun-93		DRY							1.5	1.5		100		450	120	400									
N/A	BUTSO93B	MLW-48	08-Jun-93		DRY							1.5	1.5		150		890	110	670									
N/A	BUTSO93B	MLW-52	08-Jun-93		DRY							1.5	1.5		380		220	270	690									
N/A	BUTSO93B	MLW-53	08-Jun-93		DRY							1.5	1.5		400		160	310	720									
N/A	BUTSO93B	MLW-49	08-Jun-93		DRY							1.5	1.5		98		120	63	230									
N/A	BUTSO93B	MLW-50	08-Jun-93		DRY							1.5	1.5		550		460	280	460									
N/A	BUTSO93B	MLW-29	08-Jun-93		DRY							1.5	1.5		740		730	280	780									
N/A	BUTSO93B	MLW-56	08-Jun-93		DRY							1.5	1.5		230		1400	130	630									
N/A	BUTSO93B	MLW-59	08-Jun-93		DRY							1.5	1.5		56		23	7	72									
N/A	BUTSO93B	MLW-60	08-Jun-93		DRY							1.5	1.5		200		45	9	99									
N/A	BUTSO93B	MLW-36	08-Jun-93		DRY							1.5	1.5		350		1300	280	720									
N/A	BUTSO93B	MLW-61	08-Jun-93		DRY							1.5	1.5		650		2000	720	760									
N/A	BUTSO93B	MLW-62	08-Jun-93		DRY							1.5	1.5		57		300	51	240									
N/A	BUTSO93B	MLW-39	08-Jun-93		DRY							1.5	1.5		<10		66	12	55									
N/A	BUTSO93B	MLW-63	08-Jun-93		DRY							1.5	1.5		<10		53	13	71									
N/A	BUTSO93B	MLW-64	08-Jun-93		DRY							1.5	1.5		<10		32	15	54									
N/A	BUTSO93B	MLW-65	08-Jun-93		DRY							1.5	1.5		<10		15	6	32									
N/A	BUTSO93B	MLW-66	08-Jun-93		DRY							1.5	1.5		<10		20	13	48									
N/A	BUTSO93B	MLW-67	08-Jun-93		DRY							1.5	1.5		<10		39	10	46									
N/A	BUTSO93B	MLW-68	08-Jun-93		DRY							1.5	1.5		<10		16	8	29									
N/A	BUTSO93B	MLW-70	08-Jun-93		DRY							1.5	1.5		16		130	65	180									
N/A	BUTSO93B	MLW-71	08-Jun-93		DRY							1.5	1.5		<10		50	17	66									
N/A	BUTSO93B	NB-3	03-Jun-93		DRY							1.5	1.5		34		830	13	190									
N/A	BUTSO93B	NB-31	08-Jun-93		DRY							1.5	1.5		<10		190	7	77									
N/A	BUTSO93B	NB-32	08-Jun-93		DRY							1.5	1.5		<10		290	8	54									
N/A	BUTSO93B	NB-33	08-Jun-93		DRY							60	60		650		740	360	510									
N/A	BUTSO93B	NB-34	08-Jun-93		DRY							60	60		520		1300	550	650									
N/A	BUTSO93B	NB-35	08-Jun-93		DRY							1.5	1.5		150		470	120	540									
N/A	BUTSO93B	NB-36	08-Jun-93		DRY							1.5	1.5		360		1300	180	710									
N/A	BUTSO93B	NB-37	08-Jun-93		DRY							1.5	1.5		16		90	23	82									
N/A	BUTSO93B	NB-38	08-Jun-93		DRY							1.5	1.5		15		83	17	100									
N/A	BUTSO93B	NB-39	08-Jun-93		DRY							1.5	1.5		360		970	280	84									
N/A	BUTSO93B	NB-40	08-Jun-93		DRY							1.5	1.5		250		1300	86	49									
N/A	BUTSO93B	NB-12	04-Jun-93		DRY							1.5	1.5		340		1300	140	180									
N/A	BUTSO93B	NB-41	08-Jun-93		DRY							1.5	1.5		120		230	88	130									
N/A	BUTSO93B	NB-42	08-Jun-93		DRY							1.5	1.5		<10		130	14	76									
N/A	BUTSO93B	NB-43	08-Jun-93		DRY							1.5	1.5		15		71	38	110									
N/A	BUTSO93B	NB-16	04-Jun-93		DRY							1.5	1.5		49		200	43	120									
N/A	BUTSO93B	NB-44	08-Jun-93		DRY							1.5	1.5		38		160	38	100									
N/A	BUTSO93B	NB-45	08-Jun-93		DRY							1.5	1.5		480		4500	140	450									
N/A	BUTSO93B	NB-46	08-Jun-93		DRY							1.5	1.5		210		1800	15	200									
N/A	BUTSO93B	NB-24	04-Jun-93		DRY							1.5	1.5		34		45	64	160									
N/A	BUTSO93B	NB-50	08-Jun-93		DRY							2	2		<10		22	12	130									
N/A	BUTSO93B	NB-51	08-Jun-93		DRY							2	2		3													



BPSOU Surface Soil Database

Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic		Cadmium		Copper		Lead		Zinc		pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
															mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.	mg/kg	Qual.									
N/A	BUTSO93B	MLE-11	07-Jun-93		DRY							1.5	1.5		74				2100		460		1000										
N/A	BUTSO93B	MLE-12	07-Jun-93		DRY							1.5	1.5		860				830		360		330										
N/A	BUTSO93B	MLE-14	07-Jun-93		DRY							1.5	1.5		700				2700		61		210										
N/A	BUTSO93B	MLE-15	07-Jun-93		DRY							1.5	1.5		510				3600		560		2000										
N/A	BUTSO93B	MLE-20	07-Jun-93		DRY							1.5	1.5		180				1200		220		560										
N/A	BUTSO93B	MLE-21	07-Jun-93		DRY							1.5	1.5		280				1700		450		1200										
N/A	BUTSO93B	MLE-23	07-Jun-93		DRY							1.5	1.5		470				3400		570		1500										
N/A	BUTSO93B	MLE-24	07-Jun-93		DRY							1.5	1.5		510				5000		680		110										
N/A	BUTSO93B	MLE-25	07-Jun-93		DRY							1.5	1.5		230				2600		590		1500										
N/A	BUTSO93B	MY-2	05-Jun-93		DRY							1.5	1.5		570				930		320		490										
N/A	BUTSO93B	MY-3	05-Jun-93		DRY							1.5	1.5		540				1000		340		280										
N/A	BUTSO93B	MY-5	05-Jun-93		DRY							1.5	1.5		270				620		320		1000										
N/A	BUTSO93B	MY-7	05-Jun-93		DRY							1.5	1.5																				
N/A	BUTSO93B	MY-8	05-Jun-93		DRY							1.5	1.5		130				1200		190		230										
N/A	BUTSO93B	MY-9	05-Jun-93		DRY							1.5	1.5		170				1400		240		360										
N/A	BUTSO93B	MY-10	05-Jun-93		DRY							1.5	1.5		140				970		220		180										
N/A	BUTSO93B	MY-12	05-Jun-93		DRY							1.5	1.5		26				790		59		85										
N/A	BUTSO93B	MY-13	05-Jun-93		DRY							1.5	1.5		70				750		45		89										
N/A	BUTSO93B	MY-59	11-Jun-93		DRY							1.5	1.5																				
N/A	BUTSO93B	MY-20	05-Jun-93		DRY							1.5	1.5		200				3500		490		2100										
N/A	BUTSO93B	MY-45	08-Jun-93		DRY							1.5	1.5		69				380		590		290										
N/A	BUTSO93B	MY-46	08-Jun-93		DRY							1.5	1.5		240				1200		330		1200										
N/A	BUTSO93B	MY-47	08-Jun-93		DRY							1.5	1.5		810				1800		890		6300										
N/A	BUTSO93B	MY-48	08-Jun-93		DRY							1.5	1.5		2100				3500		670		1700										
N/A	BUTSO93B	MY-38	06-Jun-93		DRY							1.5	1.5		450				1300		550		640										
N/A	BUTSO93B	MY-49	08-Jun-93		DRY							1.5	1.5		260				940		390		400										
N/A	BUTSO93B	MY-50	08-Jun-93		DRY							1.5	1.5		390				1600		500		580										
N/A	BUTSO93B	MY-40	06-Jun-93		DRY							1.5	1.5		150				620		550		880										
N/A	BUTSO93B	MY-41	06-Jun-93		DRY							1.5	1.5		120				720		760		1200										
N/A	BUTSO93B	MY-52	11-Jun-93		DRY							1.5	1.5		43				800		590		1300										
N/A	BUTSO93B	MY-53	11-Jun-93		DRY							1.5	1.5		110				1200		470		1000										
N/A	BUTSO93B	MY-57	11-Jun-93		DRY							1.5	1.5		660				880		400		200										
N/A	BUTSO93B	MY-58	11-Jun-93		DRY							1.5	1.5		710				630		630		310										
N/A	BUTSO93B	LY-2	07-Jun-93		DRY							1.5	1.5		18				240		580		830										
N/A	BUTSO93B	LY-4	07-Jun-93		DRY							1.5	1.5		140				310		650		460										
N/A	BUTSO93B	LY-5	07-Jun-93		DRY							1.5	1.5		54				370		530		1400										
N/A	BUTSO93B	LY-8	07-Jun-93		DRY							1.5	1.5		24				440		400		1300										
N/A	BUTSO93B	LY-9	07-Jun-93		DRY							1.5	1.5		2100				2500		620		420										
N/A	BUTSO93B	LY-12	07-Jun-93		DRY							1.5	1.5		21				260		660		1200										
N/A	BUTSO93B	LY-13	07-Jun-93		DRY							1.5	1.5		51				640		610		1000										
N/A	BUTSO93B	LY-14	07-Jun-93		DRY							1.5	1.5		16				140		530		1100										
N/A	BUTSO93B	LY-16	07-Jun-93		DRY							1.5	1.5		120				750		2000		2700										
N/A	BUTSO93B	LY-17	07-Jun-93		DRY							1.5	1.5		90				720		2100		1500										
N/A	BUTSO93B	LY-18	07-Jun-93		DRY							1.5	1.5		260				720		2000		3100										
N/A	BUTSO93B	LY-21	07-Jun-93		DRY							1.5	1.5		51				1000		510		1100										
N/A	BUTSO93B	LY-22	07-Jun-93		DRY							1.5	1.5		29				710		470		730										
N/A	BUTSO93B	LY-25	07-Jun-93		DRY																												



Identification Number	Data Source Reference	Sample Location Name	Sample Date	Further Sample Identification	Measurement Basis	Sample Coordinate East	Sample Coordinate North	Sample Elevation	Field Sample Number	Laboratory Sample Number	Field Duplicate Sample	Upper Sample Depth Feet	Lower Sample Depth Feet	QA/QC Level	Arsenic		Cadmium		Copper		Lead		Zinc		pH	Location	Comment	A-B Level	Post-Reclamation Map	Pre-Reclamation Map	Residential Sample	Within BPSOU	Residential Yard Sample
															mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual	mg/kg	Qual									
N/A	BUTSO93B	UY-29	11-Jun-93		DRY							1.5	1.5		120				900		610		1900										
N/A	BUTSO93B	UY-31	11-Jun-93		DRY							1.5	1.5		13				500		240		1700										
N/A	BUTSO93B	UY-32	11-Jun-93		DRY							1.5	1.5		31				360		350		1500										
N/A	BUTSO93B	UY-35	11-Jun-93		DRY							1.5	1.5		270				380		2300		2600										
N/A	BUTSO93B	UY-36	11-Jun-93		DRY							1.5	1.5		95				890		1600		1200										
N/A	BUTSO93B	UY-38	11-Jun-93		DRY							1.5	1.5		270				2400		550		1000										
N/A	BUTSO93B	UY-39	11-Jun-93		DRY							1.5	1.5		150				1600		370		1500										
N/A	BUTSO93B	UY-40	11-Jun-93		DRY							1.5	1.5		260				1400		680		1200										



C

Appendix  
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Brian Schweitzer, Governor

P.O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • [www.deq.mt.gov](http://www.deq.mt.gov)

September 22, 2006

Max H. Dodson  
Assistant Regional Administrator  
US EPA Region 8  
One Denver Place  
999 18<sup>th</sup> Street  
Denver, Colorado 80202-2405

RE: The Montana Department of Environmental Quality's Partial Concurrence in the Record of Decision, Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site

Dear Mr. Dodson:

The Montana Department of Environmental Quality (DEQ) partially concurs with the Record of Decision (ROD) for the Butte Priority Soils Operable Unit, Silver Bow Creek/Butte Area NPL Site in Montana. DEQ believes elements in this ROD will lead to significant improvement over current conditions affecting human health and the environment in the BPSOU. As the support agency, we appreciate those areas where EPA has considered our comments and suggestions, and we offer our continued support during remedial design, remedial action and long-term operation and maintenance of the BPSOU site.

DEQ concurs with and supports the following aspects of the ROD:

- EPA's determination that there are present and potential human health and environmental risks in the Operable Unit that must be addressed pursuant to CERCLA and the NCP.
- EPA's residential metals abatement program, including the prioritization method, the whole property approach to assessment and abatement, management by Butte-Silver Bow County Health Department, long-term tracking, and medical monitoring.
- The decision not to consider flow augmentation until the major remedial components described in the ROD are designed and implemented.
- The need for a controlled groundwater area as a part of this Selected Remedy, together with an adequately funded education and well abandonment program. The controlled groundwater area together with institutional controls for solid wastes left in place should minimize human contact with contaminated materials.



Max H. Dodson  
September 22, 2006  
Page 2 of 2

In partially concurring, however, DEQ does not agree with all the decisions made by EPA or all the statements and opinions expressed in the ROD. The areas of disagreement between our agencies have been extensively documented in previous State comments and won't be reiterated here. However, as you know, DEQ does not concur with the overarching decision to leave accessible, major sources of groundwater contamination in place. We refer specifically to the Parrot Tailings, Diggings East Tailings and the North Side Tailings. Our concern is that leaving these wastes in place poses a significant and permanent threat to groundwater and to the long-term water quality in Silver Bow Creek.

EPA's remedy decision relies upon capturing and treating highly contaminated ground water in perpetuity to protect Silver Bow Creek. However, the State believes that significantly more weight should have been given to Metro Storm Drain Alternative 5b, which called for the removal of the major sources of groundwater contamination, as the State in fact did at the Silver Bow Creek/Butte Area NPL site. The State believes that such removal would substantially reduce toxicity, mobility, and volume of groundwater contamination and greatly increase the permanence and long-term effectiveness of the remedy for this highly contaminated groundwater area. With the degree of uncertainty surrounding the question of whether the aquifer would clean up in a reasonable period of time following waste removal, the State believes the more protective approach of removing the major sources of contamination would be the appropriate action.

DEQ also has concerns about the long-term implementation of the Butte Reclamation Evaluation System (BRES) for waste left in place. The reclamation repair component must be aggressively implemented, adequately funded and seek to establish diverse, self-sustaining vegetative covers for this component to remain protective over time.

Again, we thank EPA for consulting with DEQ in developing the ROD. We look forward to working closely with the EPA, responsible parties, Butte-Silver Bow County Government, landowners and the public in Butte in designing and implementing the remedy to help ensure a clean and healthful environment for the citizens of the State, especially those who live or work in Butte.

Sincerely,

A handwritten signature in blue ink, appearing to read "Richard H. Oppen", with a long horizontal flourish extending to the right.

Richard H. Oppen  
Director



## Appendix D – BPSOU Potentially Responsible Parties (PRP) List

1. **Atlantic Richfield Company (ARCO)**  
Ms. Robin Bullock  
317 Anaconda Road  
Butte, Montana 59701  
Fax (406) 782-9980  
(406) 782-9964 Ext. 414  
  
Ms. Pam Sbar, Esq.  
(406) 782-9964 Ext. 414
2. **Central Butte Mining Corporation**  
Mr. Frank C. Crowley, Esq.  
44 West 6<sup>th</sup> Avenue, Suite 200  
Helena, Montana 59624  
(406) 443-2211
3. **North Butte Mining Corporation**  
Mr. Frank C. Crowley, Esq.  
44 West 6<sup>th</sup> Avenue, Suite 200  
Helena, Montana 59624  
(406) 443-2211
4. **Tzarina-Travona Mining Corporation**  
Mr. Frank C. Crowley, Esq.  
44 West 6<sup>th</sup> Avenue, Suite 200  
Helena, Montana 59624  
(406) 443-2211
5. **Mountain Con Mining Corporation/  
Mountain Mining Properties, Inc.**  
Ms. Bill O'Leary, Esq.  
Corette, Pohlman & Kebe  
129 West Park Street  
Butte, Montana 59701  
(406) 782-5800
6. **West Butte Metals**  
Ms. Bill O'Leary, Esq.  
Corette, Pohlman & Kebe  
129 West Park Street  
Butte, Montana 59701
7. **Bluebird Mining Company**  
(406) 782-5800  
Ms. Bill O'Leary, Esq.  
Corette, Pohlman & Kebe  
129 West Park Street  
Butte, Montana 59701  
(406) 782-5800
8. **New Butte Mining, Inc.**  
Mr. Frank C. Crowley, Esq.  
44 West 6<sup>th</sup> Avenue, Suite 200  
Helena, Montana 59624  
(406) 443-2211
9. **Mr. Dennis Washington** (in his individual capacity)  
c/o Ms. Becky Summerville  
Datsopoulos, McDonald and Lind  
201 West Main Street  
Missoula, Montana 59802  
(406) 728-0810
10. **Montana Resources, Inc.**  
Mr. Steve Walsh  
600 Shields Avenue  
Butte, Montana 59701  
(406) 723-4081  
  
Ms. Becky Summerville  
Datsopoulos, McDonald and Lind  
201 West Main Street  
Missoula, Montana 59802  
(406) 728-0810



**Appendix D – BPSOU Potentially Responsible Parties (PRP) List –  
Continued**

- |   |  |
|---|--|
| <p>11. <b>Montana Western Railway Company, Inc. *</b><br/>701 ½ Railroad Street<br/>Butte, Montana 59701</p> <p><b>Burlington Northern – Santa Fe Railroad has taken back ownership of the property</b><br/>Mr. Leo Berry<br/>Browning, Kaleczyc, Berry &amp; Hoven, PC<br/>139 Last Chance Gulch<br/>Helena, Montana 59601<br/>(406) 449-6220</p>  | <p>14. <b>Rarus Railroad</b><br/>Mr. Bill McCarthy<br/>300 West Commercial Avenue<br/>Anaconda, Montana 59711<br/>(406) 563-7121</p> <p>Mr. Leo Berry<br/>Browning, Kaleczyc, Berry &amp; Hoven, PC<br/>139 Last Chance Gulch<br/>Helena, Montana 59601<br/>(406) 449-6220</p>               |
| <p>12. <b>Universal Royal Apex Limited</b><br/>Mr. William F. Boyd<br/>505 Front Avenue<br/>Coeur d'Alene, Idaho 83814<br/>(208) 667-3511</p>   | <p>15. <b>Butte Silver Bow Government</b><br/>Mr. Paul Babb, Chief Executive<br/>155 W. Granite Street<br/>Butte, Montana 59701<br/>(406) 782-8262</p> <p>Mr. Jon Sesso, Planning Director<br/>(406) 782-8262 Ext. 274</p> <p>Mr. Robert McCarthy<br/>County Attorney<br/>(406) 782-8262</p> |
| <p>13. <b>Union Pacific Railroad Company/Oregon Shortline Railroad Company</b><br/>Mr. Ken Welch AVP<br/>Environmental Manager<br/>1416 Dodge Street, Room 930<br/>Omaha, Nebraska 68179</p> <p>Ms. Nancy Roberts<br/>1416 Dodge Street, Room 930<br/>Omaha, Nebraska 68179</p> <p>Mr. Leo Berry<br/>Browning, Kaleczyc, Berry &amp; Hoven, PC<br/>139 Last Chance Gulch<br/>Helena, Montana 59601<br/>(406) 449-6220</p> | <p>16. <b>City of Walkerville</b><br/>Mr. Bernie Harrington, Mayor<br/>P.O. Box 7707<br/>Walkerville, Montana 59701-7707<br/>(406) 782-2724</p> <p>17. <b>Montana Power Company</b><br/>40 East Broadway Street<br/>Butte, Montana 59701<br/><b>(PRP Cash Out)</b></p>                       |



**Appendix D – BPSOU Potentially Responsible Parties (PRP) List –  
Continued**

- |  |   |
|--|---|
| <p>18. <b>Burlington Northern Railroad Company</b><br/>Ms. Ann Blythe<br/>3800 Continental Plaza<br/>777 Main Street<br/>Fort Worth Texas 76102</p> <p>Mr. Leo Berry<br/>Browning, Kaleczyc, Berry &amp; Hoven, PC<br/>139 Last Chance Gulch<br/>Helena, Montana 59601<br/>(406) 449-6220</p>          | <p>22. <b>Western and Pacific Resources Corporation</b><br/>Mr. David Anseild<br/>Sobolewski &amp; Anseild<br/>1600-609 Grandville Street<br/>Vancouver, British Columbia<br/>V7Y1C3</p>  |
| <p>19. <b>BGM Equipment Company</b><br/>Mr. William T. McCarthy, President<br/>300 West Commercial Street<br/>Anaconda, Montana 59711<br/>(406) 563-7121</p> <p>Mr. Leo Berry<br/>Browning, Kaleczyc, Berry &amp; Hoven, PC<br/>139 Last Chance Gulch<br/>Helena, Montana 59601<br/>(406) 449-6220</p> | <p>23. <b>Kelley Resource Recovery Corporation</b><br/>Mr. Edward S. Mihelich, General Manager<br/>North Anaconda Road<br/>P.O.Box 605<br/>Butte, Montana 59703</p>   |
| <p>20. <b>U.S.A. Investments</b><br/>Mr. Brian Marler, President<br/>1005 Burston<br/>Bozeman, Montana 59715</p>   | <p>24. <b>Metanetix Corporation</b><br/>Mr. Edward S. Mihelich, General Manager<br/>North Anaconda Road<br/>P.O.Box 605<br/>Butte, Montana 59703</p>  |
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E

Appendix  
E



# **Butte Reclamation Evaluation System (BRES)**

## **Butte Priority Soils Operable Unit Silver Bow Creek/Butte Area NPL Site**

March 2006

*Prepared for:*

**U.S. Environmental Protection Agency**



*Prepared by*

**CDM**

Helena, Montana



Reclamation Research Unit  
Montana State University  
Bozeman, Montana



RESPONSE ACTION CONTRACT  
FOR REMEDIAL, ENFORCEMENT OVERSIGHT, AND NON-TIME  
CRITICAL REMOVAL ACTIVITIES AT SITES OF RELEASE OR  
THREATENED RELEASE OF HAZARDOUS SUBSTANCES  
IN EPA REGION VIII

U.S. EPA CONTRACT NO. EP-W-05-049

FINAL DRAFT  
BUTTE RECLAMATION EVALUATION SYSTEM (BRES)  
BUTTE PRIORITY SOILS OPERABLE UNIT  
SILVER BOW CREEK/BUTTE AREA NPL SITE  
BUTTE, MONTANA

Work Assignment No.: 206-RSBD-0822

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# Contents

Figures .....	iii
Tables .....	iii
Abbreviations and Acronyms .....	v
Executive Summary .....	ES-1
<b>Section 1 Overview .....</b>	<b>1-1</b>
1.1 Introduction .....	1-1
1.2 Regulatory, Removal, and Reclamation History .....	1-3
1.3 Function of Butte Reclamation Evaluation System .....	1-5
1.3.1 The BRES Tool .....	1-5
1.3.2 Evaluation of Reclaimed and Unreclaimed Lands .....	1-5
1.3.3 Schedule .....	1-6
<b>Section 2 Goals, Objectives, and Standards .....</b>	<b>2-1</b>
2.1 BRES Goals and Objectives .....	2-1
2.2 Stakeholder Involvement .....	2-1
2.3 Data Quality Objectives .....	2-1
2.4 Criteria, Standards, and Goals .....	2-7
2.5 Summary of BRES Calibration/Validation Activities .....	2-7
<b>Section 3 Process and Schedule .....</b>	<b>3-1</b>
3.1 Management and Administration .....	3-1
3.2 Timing and Overview .....	3-2
3.2.1 Annual Timetable for BRES .....	3-2
3.2.2 Long-Term Schedule .....	3-3
3.3 Field Crew Training .....	3-4
3.3.1 Vegetation .....	3-4
3.3.2 Erosion .....	3-5
3.3.3 Trigger Items .....	3-5
3.4 BRES Field Manual .....	3-6
3.5 Field Evaluations .....	3-6
3.5.1 Upland Vegetation Caps .....	3-6
3.5.2 Engineered Cap Evaluation .....	3-7
3.5.3 Residential Yards and Playgrounds .....	3-7
3.5.4 Riparian Area Evaluation .....	3-7
3.6 Annual Maintenance Evaluation .....	3-8
<b>Section 4 Polygon Delineation and Use .....</b>	<b>4-1</b>
4.1 Polygons .....	4-1
4.1.1 Polygon Delineation Process .....	4-1
4.1.2 Polygon Delineation Guidelines .....	4-2



4.1.3	Alteration of Polygon Boundaries.....	4-3
4.1.4	Annual Maintenance Evaluation and Polygons.....	4-4
4.2	Parameters Estimated by Polygon versus by Site.....	4-4
<b>Section 5 Methods and Procedures.....</b>		<b>5-1</b>
5.1	Office Preparation.....	5-1
5.1.1	Field Forms.....	5-1
5.1.2	Aerial Photographs .....	5-1
5.1.3	Supplemental Information.....	5-2
5.2	Field Survey/Site Evaluations.....	5-2
5.3	Data Transfer and Database Management.....	5-2
5.4	Quality Control Program.....	5-3
5.4.1	Vegetation.....	5-3
5.4.2	Field, Analytical, and Spatial Data.....	5-3
<b>Section 6 Evaluation Parameters .....</b>		<b>6-1</b>
6.1	Ground Cover .....	6-1
6.1.1	Live Cover .....	6-1
6.1.2	Litter .....	6-1
6.1.3	Undesirable Weedy Species.....	6-1
6.1.4	Noxious Weeds .....	6-2
6.1.5	Rocks .....	6-2
6.2	Erosion .....	6-2
6.3	Site Edges.....	6-2
6.4	Exposed Waste Material .....	6-4
6.5	Bulk Soil Failure or Mass Instability .....	6-4
6.6	Barren Areas.....	6-4
6.7	Gullies .....	6-4
6.8	Field Evaluation - Riparian Lower Area One .....	6-5
<b>Section 7 Corrective Action Triggers.....</b>		<b>7-1</b>
7.1	Polygon-Based Parameters.....	7-1
7.1.1	Vegetation.....	7-1
7.1.2	Erosion .....	7-1
7.2	Localized Trigger Parameters .....	7-2
7.2.1	Site Edges.....	7-2
7.2.2	Exposed Waste.....	7-2
7.2.3	Bulk Soil Failure or Mass Instability .....	7-2
7.2.4	Barren Areas.....	7-2
7.2.5	Gullies .....	7-3
<b>Section 8 Recommendations and Action.....</b>		<b>8-1</b>
8.1	BRES Technical Report.....	8-1
8.2	Management Review of Technical Report .....	8-2
8.3	BRES Corrective Action Directives Report .....	8-2
8.4	Annual Site-Specific Corrective Action Plan .....	8-2



Section 9 Future Activities.....	9-1
Section 10 References .....	10-1

**Figures**

Figure 3-1 BRES Management and Administration

**Tables**

Table 3-1 Long-Term BRES Schedule  
Table 8-1 Example: Overall Findings from One BRES Evaluation Period

**Appendices**

- Appendix A Mine Impact Land Assessment Logic*
- Appendix B Butte Hill Revegetation Specifications*
- Appendix C BRES Decision Logic*
- Appendix D BRES Field Form*
- Appendix E Annual BRES Process Flow Chart*
- Appendix F BRES Engineered Cap Integrity Field Form*
- Appendix G BPSOU Plant Species Classes*
- Appendix H Noxious Weed List for Montana and Butte-Silver Bow County*
- Appendix I BRES Erosion Condition Class Determination*



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## Abbreviations and Acronyms

ARARs	applicable or relevant and appropriate requirements
AR	Atlantic Richfield
ARCO	Atlantic Richfield Company
BHRS	Butte Hill Revegetation Specifications
BLM	Bureau of Land Management
BMP	best management practice
BPSOU	Butte Priority Soils Operable Unit
BRES	Butte Reclamation Evaluation System
BSB County	Butte-Silver Bow County
BSBRS	Butte-Silver Bow County Revegetation Standards
CDM	CDM Federal Programs Corporation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act, as amended
CTEC	Citizen's Technical Environmental Committee
COC	contaminant of concern
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
FS	feasibility study
FSPRA	field survey of previously reclaimed areas
FSUA	field survey of unreclaimed areas
GIS	Geographic Information System
GPS	Global Positioning System
LAO	Lower Area One
MDEQ	Montana Department of Environmental Quality
MERDI	Montana Economic Revitalization and Development Institute
mg/kg	milligrams per kilogram
m <sup>2</sup>	square meter
NPL	National Priorities List
N-TCRA	non-time critical removal action
OU	operable unit
O&M	operation and maintenance
RAOs	remedial action objectives
RGs	remedial goals
PRP	Potentially Responsible Party
QC	quality control
RASD	response action summary document
RI	reclamation improvement
RI/FS	remedial investigation/feasibility study
ROD	record of decision
RRU	Reclamation Research Unit
SAP	sampling and analysis plan



TCRA	time-critical removal action
UWS	undesirable weedy species
VI	vegetation improvement



## Executive Summary

Land reclamation has been, and will continue to be, a vital component of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response actions implemented at the Butte Priority Soils Operable Unit (BPSOU). Response actions may also involve a variety of engineering applications including storm water controls, caps over mine waste, and waste removals. The Butte Reclamation Evaluation System (BRES) is the result of the U.S. Environmental Protection Agency's (EPA's) recognition of the need for a formalized assessment tool to evaluate the stability, integrity, and continued protection of human health and the environment attained by land reclamation over the long term. As specified in the record of decision (ROD), the BRES (i.e., this document) sets the performance standard that all reclaimed areas in the BPSOU must achieve, the methodology for evaluating these reclaimed areas, and guidelines for corrective actions.

One important response action technology at the BPSOU is the construction of caps over waste areas or contaminated areas. An erosive cap is unstable and impermanent. If the cover soil comprising the cap erodes to a point where waste material is exposed, contaminants of concern (COCs) may be transported off-site by water or wind, and may come into contact with human or environmental receptors on the site. The BRES describes quantifiable evaluation criteria (e.g., vegetation cover, erosional condition, gullies, etc.) that must be achieved and maintained on reclaimed areas to ensure protectiveness. The periodic evaluation of reclaimed sites against the BRES performance standard will direct the appropriate types of corrective actions that may be needed at each site.

The BRES is specifically designed for use in the upland environment in Butte, Montana. To accommodate the diverse land types and end land uses within the BPSOU, the BRES is designed to address reclaimed uplands in residential, recreational, and commercial/industrial land settings. However, residential yards, and playgrounds are specifically excluded from the BRES. The BRES has components that allow it to be applied to areas reclaimed as open space within this urban setting.

During the 2001 field season, EPA, with input from the stakeholder Technical Group, calibrated and validated the Draft BRES (CDM Federal Programs Corporation [CDM]/Reclamation Research Unit [RRU] 2003) so that the system would be ready for use upon issuance of the ROD. This process involved evaluating a select number of sites, identifying the level of training required of field personnel to obtain precise (i.e., reproducible) results, refining methods and procedures, and identifying relevant reclamation performance standards. The BRES Calibration and Validation Report (CDM/RRU 2003) describes that process in detail. Now that it has been validated and calibrated for use on remediated sites at the BPSOU, the BRES provides the means for representatives of EPA, Montana Department of Environmental Quality (MDEQ), the Potentially Responsible Party (PRP) Group, consultants, and others to determine if these lands are being maintained at a level consistent with remedial objectives.



The BRES program described herein meets EPA's goals of having an assessment tool that:

- Emphasizes soil and vegetation parameters critical to maintaining site stability, integrity, and overall protectiveness of the remedy
- Can be easily and quickly applied in the field to evaluate the large number of sites
- Utilizes a minimum amount of equipment
- Is simple to learn by new evaluators
- Provides precise (i.e., reproducible) results when applied by different evaluators

This document describes the overall BRES program, which includes the components of the BRES, how the BRES should be applied in the field, and how the BRES fits into the long-term operation and maintenance, which includes tracking, monitoring, and maintenance of reclaimed sites at the BPSOU.

EPA has identified six preparatory activities that should be completed prior to field evaluation of reclaimed sites using the BRES:

- Finalizing the list of response action sites that will be included in the BRES program
- Obtaining new low-level aerial photographs for use during BRES assessments
- Delineating discrete polygons where appropriate within remediated sites for evaluation under the BRES
- Completing the BRES Field Manual
- Fine tuning the engineered cap integrity checklist/evaluation process based on field experience
- Designing and implementing a data management strategy to ensure accurate and complete tracking of BRES information



# Section 1 Overview

## 1.1 Introduction

In the ROD, EPA specifies that the BRES is a performance standard that reclaimed areas in the BPSOU must achieve. The BRES is an evaluation tool developed to ensure the integrity of most reclaimed lands, including soil cover caps or other forms of engineered caps covering mine-waste material left-in-place. These caps must perform at a level that maintains long-term protection of human health and the environment and otherwise complies with performance standards at the BPSOU.

It is important to understand that the BRES is not an operation and maintenance (O&M) plan. The BRES sets forth the performance standard that reclaimed areas must achieve. The BRES also provides the methodology to guide the evaluation of the reclamation against the performance standard. The periodic evaluation of reclaimed sites against the BRES performance standard will direct the appropriate level of corrective action work that may be needed at each site.

BRES-directed corrective action work may simply be some type of typical O&M, such as vegetation improvements (VI) or repair of actively eroding gullies. However, corrective action may also involve full and complete reclamation of a response action site. This BRES-directed corrective action work differs from more “conventional” O&M (e.g., controlling access, maintenance of fences, weed spraying, litter control, etc.) because the corrective action is directed specifically at maintaining cap integrity. Conventional O&M activities will be outlined in a separate O&M plan.

The BPSOU is one of three remedial OUs identified by EPA within the Butte Area portion of the Silver Bow Creek/Butte Area National Priorities List (NPL) site within and near Butte, Montana. The OU consists of historic mining sites situated entirely within an urban setting, encompassing much of the cities of Butte and Walkerville. Mine waste and mill tailings accumulated from over 100 years of mining are dispersed throughout the OU, posing health risks to human and ecological receptors.

Soon after Butte was named a Superfund site, EPA recognized that arsenic- and lead-contaminated wastes within the populated urban area of Butte presented health risks. As a result, numerous response actions (Non-Time Critical Removal Actions [N-TCRAs] and Time Critical Removal Actions [TCRAs]) were implemented beginning in 1988 and continuing through the Remedial Investigation/Feasibility Study (RI/FS) process leading up to the ROD. Over 400 acres of land within the BPSOU were addressed through response actions prior to the ROD. The RI/FS determined that, in most cases, source controls, capping, and land reclamation techniques used during response actions to address contaminated solid media were consistent with the long-term remedial goals for the site and adopted most of the response actions as a portion of the remedy for contaminated solid media at the BPSOU.



Reclamation in Butte evolved over time as factors controlling reclamation success were better understood and implementation practices improved. Response actions taken for mine-impacted lands within the BPSOU involved a variety of engineering applications, including storm water controls, caps over mine waste, and removals. The remedial investigation report identified 182 mining-related sites that have been impacted by or represent potential sources of arsenic and metal contaminants within the BPSOU (PRP Group 2002). While most of these sites have been addressed under EPA-sanctioned response actions prior to the ROD, cap integrity and vegetation response at the BPSOU have been inconsistent, due in part to the variations in the procedures and practices used by the various entities to reclaim these sites. These entities have included the EPA, Atlantic Richfield (AR), MDEQ, and former state agencies.

Recognizing the need to evaluate the stability, integrity, and degree of protection attained by reclamation, EPA began formally evaluating these lands in 1992. Since then, EPA has conducted land reclamation assessments in Butte, Anaconda, and at a variety of sites throughout the Clark Fork River Basin of Montana. During this period, several soil and vegetation parameters were used to provide data and information regarding the efficacy of reclamation efforts on these mine lands. From this work, EPA recognized the need for a formalized evaluation tool that would allow agency personnel to determine whether sites were meeting the remedial goals and if that trend was likely to continue. EPA requirements for such a tool are that it must:

- Emphasize soil and vegetation parameters critical to maintaining site stability, integrity, and overall protectiveness;
- Be easily and quickly applied in the field due to the large number of sites that need to be evaluated;
- Utilize a minimum amount of equipment;
- Be simple to learn by new evaluators; and
- Provide precise (i.e., reproducible) results when applied by different evaluators.

The BRES is the resulting formalized assessment tool to evaluate the performance standard compliance, stability, integrity, and protectiveness attained by reclamation within the urban upland environment in Butte. The methodology was first proposed in the initial draft BRES document (CDM/RRU 2000) and discussed at a public meeting of interested stakeholders in September 2000. At the meeting, EPA received written comments on the BRES from the MDEQ, AR, Big Butte Biologic Compost, Bighorn Environmental, Butte-Silver Bow (BSB) County, the Citizens Technical Environmental Committee (CTEC), and the Natural Resource Conservation Service. EPA was pleased with the number and quality of constructive stakeholder comments and responded formally to each comment in a document entitled *EPA Responses to Comments Received on the Butte Evaluation System Revision 0 Dated August 15, 2000*



(CDM 2001). Since then, the BRES has been further refined for use with the BPSOU ROD

The BRES is specifically designed for use in Butte. To accommodate the diverse land types and end land use within the BPSOU, the BRES is designed to address residential, recreational, and commercial/industrial land uses. Residential yards and playgrounds are specifically excluded. The system also has components that allow it to be applied to areas reclaimed as open space within the upland urban setting.

## 1.2 Regulatory, Removal, and Reclamation History

In 1991, EPA developed the Statement of Work for the BPSOU RI/FS (CDM 1991). The RI/FS was separated into two phases: Phase I and Phase II, which were to be implemented concurrently. Phase I tasks focused on mine wastes and contaminated soils within residential areas and in adjacent and upgradient contaminant source areas within the OU where the potential for human health impacts from exposure to contaminants was greatest. Phase II focused on an evaluation of the characteristics and impacts of metals and arsenic contamination on Silver Bow Creek, and on other source materials located outside of residential areas.

In 1994, the Montana Natural Resource Information System produced Map 94ARCO68 that compiled all of the facilities and source areas that had been identified within the BPSOU by EPA, State Agencies, BSB County and other entities comprising the PRP Group. Map 94ARCO68 depicts the reclamation status of the BPSOU (unreclaimed areas and areas where reclamation/removal activities had been completed) through 1993. This map served as the basis for further site characterization and reclamation work during the Phase II BPSOU Remedial Investigation.

In 1996, EPA approved the Final Phase II RI/FS Work Plan and Addendum for the BPSOU (PRP Group 1996a). This document presented a plan to build upon the soil/waste characterization and removal reclamation work that had been compiled on Map 94ARCO68. The goal for the Phase II RI/FS Soil/Mine Waste Investigation was to fully characterize the BPSOU with respect to contaminated soil and waste material. To accomplish this goal, EPA, together with the State and the PRP Group, conducted the field survey of unreclaimed areas (FSUA) and the field survey of previously reclaimed areas (FSPRA).

The FSUA was conducted to complete the site characterization with respect to unreclaimed land within the BPSOU (outside of residential areas) and identify those source areas that exceed arsenic and/or lead removal action levels for removal/reclamation. The FSUA integrated previously-collected analytical data with new analytical data and observations to identify source areas that exceed action level lead and/or arsenic concentrations and areas that may potentially impact surface water quality through erosion and off-site sediment transport.

Previously reclaimed sites were evaluated as part of the FSPRA. The goal of the FSPRA was to evaluate all the facilities/source areas identified as "reclaimed" on Map



94ARCO68 to determine whether these sites were adequately reclaimed for the purposes of final remediation at the BPSOU. The work plan specified that:

- Those facilities/source areas that are adequately reclaimed require only continued short-term O&M at this time.
- Those facilities/source areas that are inadequately reclaimed require additional reclamation prior to reverting to long-term monitoring and corrective action as appropriate.

The FSPRA evaluated previously reclaimed sites in accordance with reclamation protocol described in a document entitled *Field Survey of Previously Reclaimed Areas Site Inspection Protocol* (PRP Group 1996b). This document did not make final remedial action determinations for any site. Final remedial decisions regarding these areas are contained in the ROD. The response action summary document (RASD) and the feasibility study (FS) contained additional evaluation of the reclaimed areas.

Final summary documents for the FSUA and FSPRA were published in 1997 and include:

- Final Field Survey of Unreclaimed Areas Summary Report (CDM 1997)
- Technical Memorandum: Field Survey of Previously Reclaimed Areas (PRP Group 1997a)

The FSUA identified 27 unreclaimed sites with lead concentrations greater than the 2,300 mg/kg non-residential action level, and 32 sites with arsenic concentrations that exceeded the 500 mg/kg commercial action level for arsenic. Three of the sites that exceeded the commercial arsenic action level also exceeded the non-residential lead action level.

The FSPRA evaluated the condition of 95 reclaimed areas in 1996 and 1997. Twenty-nine sites evaluated during the FSPRA were identified as being inadequate with respect to the reclamation protocol and required further reclamation.

With the exception of seven sites slated to be addressed under the Montana Economic Revitalization and Development Institute (MERDI) Program, the PRP Group reclaimed all the sites that were identified in the FSUA with lead concentrations above 2,300 mg/kg and the previously reclaimed sites identified for additional reclamation during the FSPRA. This work was conducted under the two EPA-approved Response Action Work Plan Addenda for the Previously Reclaimed Areas Operation and Maintenance (PRP Group 1997b) and the 1997 Unreclaimed Areas (PRP Group 1997c). Reclamation was performed in accordance with the EPA-approved Butte Hill Revegetation Specifications (BHRS). Sites identified during the FSUA with arsenic concentrations above the arsenic action level (residential - 250 mg/kg; commercial - 500 mg/kg; and recreational [open space] - 1,000 mg/kg) may



be removed or reclaimed as part of future response actions. Techniques and methods used to address these sites were evaluated in the FS.

### **1.3 Function of Butte Reclamation Evaluation System**

This section describes the function of the BRES within the CERCLA regulatory framework set forth by EPA for the BPSOU. Other key components of the CERCLA process, with respect to the BPSOU, are also discussed.

Appendix A provides a flow chart that depicts the regulatory logic by which mine-impacted lands within the BPSOU were addressed prior to the ROD, and how performance standards set by the BRES will be used to maintain reclaimed sites after the ROD. This section further describes how response action sites within the BPSOU will be evaluated by the BRES to ensure that they are maintained at a level that will remain protective and otherwise comply with performance standards over the long-term.

#### **1.3.1 The BRES Tool**

The BRES is a tool that establishes detailed performance standards and the methodology used to evaluate the stability, integrity, and degree of human and environmental protectiveness afforded by EPA-sanctioned response actions implemented on lands impacted by mining within the BPSOU. The BRES will be used to continuously evaluate and maintain reclaimed and revegetated sites in perpetuity. Results from the application of the BRES will be used to trigger corrective actions that ensure the response actions are appropriately maintained.

#### **1.3.2 Evaluation of Reclaimed and Unreclaimed Lands**

As described in Section 1.1, the FSUA was implemented as part of the Phase II Remedial Investigation to identify and characterize all unreclaimed mine-impacted land within the BPSOU, and the FSPRA was implemented to evaluate all previously reclaimed land within the BPSOU. Unreclaimed sites that were identified in the FSUA with lead concentrations above the remedial goal (RG) of 2,300 mg/kg (excluding the MERDI properties), and previously reclaimed sites identified for additional reclamation during the FSPRA, were subsequently reclaimed in accordance with the BHRS. As a result of this process, all mine-impacted lands identified in the two documents within the BPSOU fall into one of the following three categories:

1. Current reclamation deemed protective for the short-term. Sites are designated for long-term monitoring and corrective action, as appropriate.
2. Unreclaimed site with lead concentration below the PRG (2,300 mg/kg). Sites in this category may exceed the arsenic removal action level and may contain elevated concentrations of other contaminants of concern (e.g., copper and zinc that may adversely impact surface water quality).
3. The site is one of seven MERDI properties.



The MERDI properties are slated for urban development under the MERDI program. Plans for the MERDI properties will be evaluated by EPA to ensure that these sites are developed in a fashion that complies with ARARs and provides for the long-term protection of human health and the environment.

Sites falling into categories 1 and 2 were evaluated in the RASD and the feasibility study (FS) to direct the selection of the final remedy for these sites in the ROD. The regulatory functions of the RASD, FS, ROD, and the BRES, in the context of mine-impacted lands at the BPSOU, are briefly described below.

### **1.3.3 Schedule**

This Final BRES document describes the basis for the BRES and incorporates changes to the BRES methodologies based on stakeholder comments and the 2001 calibration and validation work conducted by the Technical Group. (This work is fully described in the Calibration and Validation Report [CDM/RRU 2003]). The final portion in the development of the BRES will be the preparation of a field manual for use by the field team during BRES evaluations. The BRES Field Manual will be developed after the finalization of the ROD and will be appended to this BRES document. Polygon delineation at BPSOU response action sites and database development (discussed in later sections) should commence immediately following the completion of the ROD.



## **Section 2 Goals, Objectives, and Standards**

### **2.1 BRES Goals and Objectives**

The BRES is identified in the ROD as the program used to evaluate the integrity of all reclaimed land, soil cover caps, or other forms of engineered caps covering mine-waste material left-in-place at the BPSOU. This system establishes evaluation procedures for performance standards to direct the long-term monitoring and corrective action of response actions to which it applies. The BRES will ensure that response actions and future remedial actions are maintained at a level that provides for the continuous protection of human health and the environment and compliance with ARARs.

EPA's goal is to have a reclamation evaluation procedure that can quickly, consistently, and cost-effectively identify areas of current or imminent reclamation failure, and determine what specific actions are required to remediate those areas to acceptable condition. Several attempts have been made by various entities to establish reclamation performance standards and a methodology to evaluate response action sites at the BPSOU, including draft versions of the BRES. After consideration of comments on previous drafts and evaluation of on-the-ground experience, the BRES is EPA's final determination regarding a necessary and appropriate evaluation system.

The BRES is designed to facilitate the collection of precise (repeatable) information by persons with experience in ecological and soil erosion assessment techniques. The system enables the assessors to quickly collect information that describes post-reclamation conditions with a minimal amount of field equipment. The BRES includes a field training program and a field manual with example photographs to guide the field crew. The system also incorporates historic site data into the decision-making process.

### **2.2 Stakeholder Involvement**

EPA realized during the initial meetings with the BSPOU stakeholders that their involvement and input during the development of the BRES was important and useful. During BRES development, stakeholder representatives from BSB County, ARCO, MDEQ, CTEC, and EPA were involved at two levels: technical and management. During this period, which included the calibration and validation process, the Technical Group identified evaluation parameters and developed site assessment methodologies while the Management Group provided guidance by establishing overarching objectives and considerations.

### **2.3 Data Quality Objectives**

The data quality objective (DQO) process (EPA 2000) describes EPA's policy for describing project decisions, the data quality required to support those decisions, specific data types needed, data collection requirements, and analytical techniques



necessary to generate the specified data quality. The process also ensures that the resources required to generate the data are justified. Using the DQO process consists of seven steps. The use of DQOs in the development of the BRES is discussed below.

### **Step 1: State the Problem**

**The purpose of this step is to describe the problem to be studied so that the focus of the study will be unambiguous.**

Many mine waste areas containing elevated concentrations of contaminants of concern (COCs) have been addressed “in-place” at the BPSOU through response actions involving land reclamation techniques using coversoil caps and revegetation. These actions have been designed to cap and stabilize COCs such that they no longer pose threats to human health or the environment. At these sites, vegetated and engineered cap integrity is critical to ensuring waste does not become exposed. Monitoring and corrective action, as appropriate, of reclaimed areas at the BPSOU is required to ensure healthy stands of vegetation and to maintain the integrity of soil caps in perpetuity (EPA 1999b). Proactive monitoring of these areas and conducting the appropriate level of corrective action will therefore be required. With these issues in mind, EPA developed the BRES in conjunction with the stakeholder groups to address several problems related to these needs.

For this project, the planning for developing the BRES tool was conducted by EPA, the decision makers for the BPSOU, with support from their contractors, CDM and the RRU. Stakeholder input was received from BSB County, ARCO, MDEQ, and CTEC. These stakeholders will play vital roles for the use of the BRES, which includes future implementation, technical support, citizen advisory, funding, and agency oversight of the BRES.

This Final BRES was completed for incorporation into the ROD. However, certain specific components of the BRES (e.g., polygon delineation) will be developed and/or refined after the ROD as part of the remedial design activities at the BPSOU.

### **Step 2: Identify the Decision**

The principal study question and the alternative actions are listed below.

Principal Study Question	Alternative Actions
Does the initial version of the BRES meet its intended goal to provide an objective and precise method for evaluating the long-term protectiveness of response actions at the BPSOU?	<ol style="list-style-type: none"> <li>1. Recommend the use of the BRES without modification.</li> <li>2. Work with the stakeholders to modify the BRES such that it meets the objective.</li> </ol>

In working with the stakeholders during the initial phase of the BRES development, it was determined that the initial draft BRES methodology (CDM/RRU 2000) did not



meet the intended goal, but could with appropriate modification. The stakeholders identified important questions that, once answered, would allow the BRES to meet the intended goal; these included:

- Were any changes needed to the list of BRES parameters?
- What methodology should be used to evaluate each parameter?
- How precise do field estimates need to be?
- What parameters were identified as trigger items (see below) and what metrics should be used to trigger additional response action?
- If action is recommended, what type of action will be required to bring the site up to an acceptable level?
- Should response action sites be evaluated as one unit or are there compelling reasons to divide sites up to better understand conditions and the need for additional action?
- What, if any, historical data or other information is available for a particular response action site that might make the decision-making process more efficient and thorough?

### **Step 3: Identify the Inputs to the Decision**

Information and data required to answer the above questions include the following:

- Percent live cover data for desirable species, undesirable weedy species (UWS), noxious weeds, litter, and rocks greater than two inches on a site
- Identification of desirable species and weedy species that are dominant, frequent, and infrequent
- Identification of a precise erosion evaluation methodology (modified Bureau of Land Management [BLM] procedure with seven variables to score was used)
- Identification of a precise cover estimation methodology (an ocular technique was used in conjunction with quantitative point measurement verification to improve visual cover estimates and meet the precision goal)
- Identification of exposed mine waste (or the potential for waste to become exposed), site edge problems, bulk soil failure, land slumps, subsidence, barren areas, and/or gullies

To improve the precision (or repeatability) of BRES estimates, it is necessary to divide response action areas into smaller land units, called polygons. This will be accomplished by assessing the variability of vegetation cover, erosion, size and degree of barren areas, and land forms and land use throughout the response action site. The overall size of the response action site and the potential size of polygons were also evaluated (see Step 5 for a discussion on the metrics used to determine when polygon delineation is appropriate).



From the information variables listed above, maintenance action triggers were identified. Triggers are specific parameters and their associated metrics (see Step 5). Polygon-based trigger parameters are vegetation and erosion. These parameters are evaluated for the polygon as a whole. Localized trigger parameters, which initiate an action if they are observed anywhere in the polygon, are site edge problems, exposed waste material, bulk soil failure or mass instability, barren areas, or the presence of gullies. If a trigger is identified, the BRES logic diagrams for that trigger item (Appendix C) form the basis for decisions about required data or corrective action. When additional quantitative environmental data are required, the PRP Group will submit a site-specific sampling and analysis plan (SAP) to EPA.

#### **Step 4: Define the Study Boundaries**

The spatial boundaries of the BRES program encompass the upland BPSOU areas that have undergone response actions. The Geographic Information System (GIS) will serve as the tracking mechanism for the boundaries of the individual BRES sites. These boundaries were defined by a stakeholder group effort and will remain fixed unless site boundaries are changed as a result of the ROD or remedial design. Each response action area will be evaluated in terms of the need to delineate polygons. Polygon boundary delineation will occur over several years (i.e., it will take several years because of the large number of sites) and the boundaries will remain fixed; however, boundaries can be changed after two full BRES evaluation periods (i.e., after eight years). Boundary alteration is discussed in Section 4.1.3. It is recommended that site evaluations occur between mid-late June and early August.

#### **Step 5: Develop a Decision Rule**

The primary BRES decision rule involves determining whether a response action site requires corrective action. During the 2001 calibration and validation process, EPA and the other stakeholders customized the BRES so that this decision could be made with known accuracy and precision. This step of the DQOs identifies and discusses:

1. Parameters that were developed to characterize response action sites in terms of meeting human health and environmental risk objectives and performance standards
2. Metrics ("action levels" in DQO parlance) used for each parameter that collectively go into the corrective action decision
3. Accuracy and precision in making parameter estimations and corrective action decisions

The BRES parameters and their associated metrics were refined by the stakeholders in the field during the 2001 calibration and validation process. All potentially useful parameters were evaluated during this process and many different metrics were used before the stakeholders felt the system was calibrated and would provide accurate and precise information for use in making corrective action decisions. See Section 7



and the Calibration and Validation Report (CDM/RRU 2003) for more detailed discussion on this process.

The parameters deemed appropriate by EPA and the stakeholders during the development of the BRES are vegetation cover, erosion, the presence of gullies or exposed waste material, the condition of site edges, and the existence of barren areas (see BRES field evaluation form [Appendix D]). The BRES evaluation contains decision diagrams (Appendix C) to help evaluators determine what additional data are required or what corrective action should be taken for a particular site. The diagrams apply decision rules for the key parameters (i.e., the trigger items); these are briefly discussed below and detailed discussions are provided in Section 7.

### ***Vegetation Cover***

In accordance with the Strip and Underground Mine Reclamation Act, SS 82-4-201 through 82-4-254, MCA, the BRES must ensure that vegetated cover soil caps and other reclaimed lands within the BPSOU support a diverse plant community including native species to the extent that the constituents of the vegetation cover are not incompatible with the performance of the remedy.

1. For polygons that fall in the lowest live vegetation cover category (less than 21 percent), the technical recommendation is that the site undergo either vegetation or reclamation improvement (VI or RI). If a site undergoes VI, and then falls into the less than 21 percent live cover category again during the next BRES evaluation, the polygon is then required to undergo RI in order to meet the BHRS.
2. For polygons that fall into the middle live vegetation cover category (21-40 percent), UWS are considered. If greater than 10 percent of the polygon is covered by UWS, then a recommendation will be made that VI be implemented on the polygon. If less than 10 percent of the area of the polygon is covered by UWS, then the polygon should undergo a regularly-scheduled BRES evaluation in four years.
3. Polygons that fall into the upper vegetation cover category (41-100 percent) should be re-evaluated in four years.

### ***Erosion***

If the erosion evaluation score is 55 or less, no immediate action is required and the polygon will continue on the regular BRES evaluation schedule of every four years. A score of greater than 55 triggers a recommendation for corrective action. The need for an engineering assessment and O&M plan are discussed in Section 7.

### ***Gullies***

If a gully exists within a polygon, it should be noted on the field evaluation form whether the gully is actively eroding or healing. If the gully is healing as defined by the BRES, no immediate action is required and the polygon will continue on the regular BRES evaluation schedule of every four years. Action is recommended for actively eroding gullies. The engineering assessment, corrective action plan, construction schedule, and further evaluations are discussed in Section 7



### ***Exposed Waste Material***

If there is exposed waste on a site, it triggers a recommendation for action. Signs of bulk soil failure or land slumps also trigger a recommendation for action. An engineering assessment should be performed on these areas to determine the appropriate type of corrective action needed to repair the cap.

### ***Site Edges***

The site edge trigger parameter is primarily for monitoring purposes, except when gullies or exposed waste materials are present. As previously described, for these circumstances, the recommendation is for corrective action to repair the gully, and for removal or covering of exposed waste material. If neither gullies nor exposed waste exist, yet a significant difference is identified between the site edge and the site interior, then the area should be tracked in the GIS and O&M databases for future trend analysis to determine whether site edge condition is improving or declining. These sites should undergo a regularly-scheduled BRES evaluation in four years, which must include the entire polygon, not just the barren areas.

### ***Barren Areas***

If barren area(s) are located within a polygon, but cover less than 25 percent of the polygon, a VI plan and/or a RI plan must be developed to repair only the barren area(s). If a VI plan is implemented and the next BRES evaluation at the site indicates that the VI actions failed, the barren area(s) must be addressed according to the BHRS. If barren area(s) cover 25 percent or more of a polygon, the same decision logic is used, except that the VI plan and/or RI plan must include the entire polygon, not just the barren area(s). If a VI plan is implemented and the next BRES evaluation indicates that the VI actions fail, a RI plan must be developed and approved and the entire polygon must then be brought up to the BHRS.

Under each of the above circumstances, corrective action work must be completed within a calendar year of the BRES evaluation and the polygon should then undergo a full BRES evaluation three years following completion of the corrective action work (e.g., four years after the initial BRES assessment).

### **Step 6: Specify Tolerable Limits on Decision Errors**

General sources of potential errors in using the BRES involve the inexperience of novice field crew members. These types of errors will be brought within tolerable limits by 1) selecting crew members with experience with this type of environmental assessment, and 2) conducting an annual training program on all aspects of the BRES. Decision errors that can occur during the collection of cover and erosion data are recognized, and procedures are therefore built into BRES to meet tolerable limits for these types of data. The method of training field crews to estimate cover and the selection of cover classes (e.g., 21-39 percent live vegetation cover) were chosen to hold decision errors within tolerable limits. During training sessions, the field crew's ability to precisely estimate cover is repeatedly tested by comparing visual estimates to quantitative measures of cover. Once field crew members can repeatedly estimate



vegetation cover to within  $\pm 10$  percent of the measured value, the tolerable limit has been met and the vegetation portion of the training is complete.

During the initial erosional condition training session field crew members will calibrate themselves by scoring erosional condition on different BRES polygons using the BRES Erosion Condition Class Determination guidelines (BLM 1981), and then comparing individual scores with one another. Once the field crew can reliably rank erosional condition within  $\pm 10$  percent of the group mean, the tolerable limit for erosion estimating has been met and the erosion evaluation portion of the training is considered complete.

#### **Step 7: Optimize the Design**

The BRES procedure described in the initial BRES document (CDM/RRU 2000) was optimized during the 2001 field calibration and validation work. System design was optimized to increase field worker efficiency in pre-assessment preparation, field data collection precision, and decision making logic. Training sessions to optimize the precision of field crew members are necessary. Pre-assessment preparation supplies field personnel with available GIS information pertinent to the field survey, including an aerial photograph with site boundaries highlighted. The field form includes spaces for pertinent data, which is quick and easy to collect. The BRES includes a field manual that summarizes the BRES methodology so that it is easy to use in the field. To the extent possible, data should be collected and stored electronically in the field to minimize post-field data entry. The decision logic diagrams clearly indicate actions required at sites found to require corrective action.

Further refinement of the BRES design will occur as polygon delineation is completed and the database is developed.

## **2.4 Criteria, Standards, and Goals**

Existing criteria, standards, and goals were incorporated into the design of the BRES. The BRES was built around RAOs for contaminated solid media and RGs (as described in the final ROD), as well as the BHRs (Appendix B), the Butte-Silver Bow County Revegetation Standards (BSBRS) (BSB 1995a, b; BSB 1996), and reclamation and revegetation ARARs.

## **2.5 Summary of BRES Calibration/Validation Activities**

BPSOU stakeholders were involved in the 2001 field BRES calibration and validation effort at two levels, the technical level and the management level. Both groups provided input into the calibration and validation process.

Two overarching goals were identified for the calibration and validation field season. These were to: (1) develop a system that can accommodate the environmental variability within sites and adequately describe (to management) the conditions at a site, and (2) formalize the decision-making process in terms of the recommended maintenance of vegetated caps. The Technical Group worked interactively during 2001 to verify the BRES evaluation parameters in the Draft BRES document and to calibrate and validate the evaluation techniques so that the system could achieve



EPA's goal of having a cost-effective procedure that would yield accurate and reproducible results. The Technical Group agreed that ultimately the BRES must be a tool for managers and decision makers to ensure the long-term integrity of reclaimed sites within the BPSOU. To meet these overall goals, the Technical Group's tasks for the 2001 BRES calibration and validation program were to:

- Select a set of reclaimed sites to test the Draft BRES. These sites included the full range of land types and reclamation conditions present at the BPSOU.
- Verify the efficacy of evaluation parameters in the Draft BRES document and either add or delete parameters.
- Resolve technical, managerial, training and implementation issues through interactive dialog among Technical Group members and build consensus on all issues to the extent possible.
- Ensure that the Final BRES would have a consistent decision logic to make technical recommendations for either repairing problem sites or monitoring potential problem sites.

The general approach to the calibration and validation process was to continue to test and refine the Draft BRES in an iterative manner until the Technical Group was satisfied that the system was ready for use at the BPSOU.

During the calibration and validation field season, the Technical Group visited 13 sites that were representative of the complexity found the BPSOU. Evaluations were performed at these sites as a means to develop and finalize the BRES field form and decision logic for technical recommendations for site corrective action. Specific decision diagrams were created for each of the parameters evaluated in the BRES and a time frame for evaluations and cap repairs was established. At the end of the summer, the Technical Group presented a new draft of the BRES to the Management Group in a series of three meetings and presentations. The Technical Group received suggestions and recommendations for the Management Group and altered parts of the system based on these recommendations; these revisions are included in this final BRES document.



## Section 3 Process and Schedule

This section outlines the management of the BRES program and the annual and long-term schedule for the BRES process.

### 3.1 Management and Administration

Figure 3-1 depicts the BRES management and administration organization structure. The BRES Administrator from the PRP Group will direct the field evaluators and oversee BRES-related data storage issues and maintenance construction. This individual will be advised by and report to the Technical Group, whom will report directly the Management Group. EPA, as the lead agency, and MDEQ, as the support agency, will oversee the BRES program.

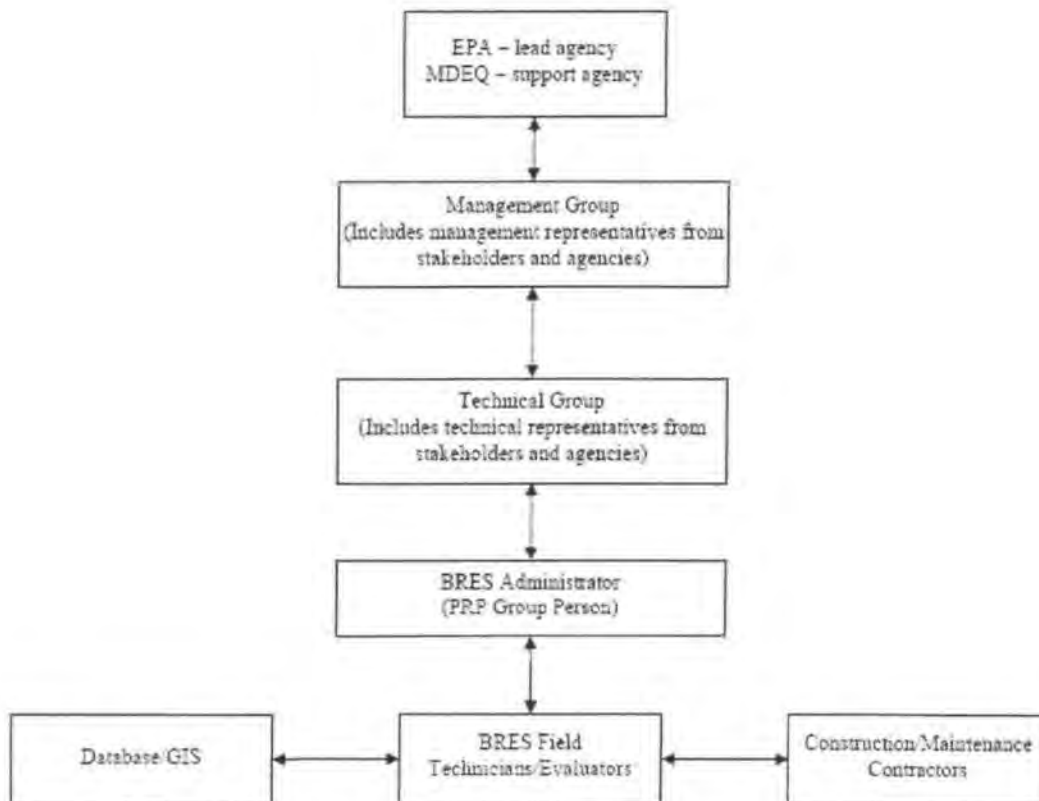


Figure 3-1  
BRES Management and Administration



## 3.2 Timing and Overview

The first year of BRES implementation will follow the ROD. Polygons must be delineated for sites prior to BRES implementation. The summer following polygon delineation will become Year 1 for the BRES process. Annual BRES events are described below. The BRES process will continue indefinitely, unless another program for assessing reclamation is developed by EPA.

### 3.2.1 Annual Timetable for BRES

The annual BRES process is documented in the Annual BRES Process Flowchart (Appendix E). The BRES Administrator, on behalf of the PRP Group, shall be responsible for meeting reporting deadlines and ensuring that field data are collected, reported, and tracked in the O&M database in a timely manner.

Pre-field assessment preparation should take place in the spring of each year. For the individual sites scheduled for BRES evaluation during the upcoming summer, the administrator should organize reports containing pertinent site information and aerial photographs from the O&M database and GIS. Details about this task are presented below. After pre-field-assessment preparation, the field training session should begin (described below).

Field evaluations will follow the one- to two-week training period. Data may be entered into the BRES database during collection or at the end of the field season. After the field evaluations, the administrator will complete a report of technical recommendations, based on the BRES results and the corresponding BRES decision logic.

The Management Group, which is composed of management representatives of the BPSOU stakeholders, will review the report of technical recommendations and develop a set of management directives, based on recommendations and pertinent modifying criteria. EPA, in consultation with MDEQ, will adopt or modify these recommendations. The final directives will instruct the PRP Group regarding the corrective action work that should be done within the calendar year of the site field evaluations. Based on the final directives, the PRP Group shall develop site-specific O&M corrective action plans. If BRES logic directs further sampling or assessment of sites in order to make a corrective action decision, the PRP Group should notify EPA of sampling or additional assessment activities in time for EPA to review and approve the SAP and provide oversight.

Documentation will be maintained on a site-specific basis. This documentation includes historic data, corrective action reports, and SAPs. Separate files will allow the BRES Administrator and others to track the data, assessment results, and corrective action measures for each site.

The EPA will review and approve the site-specific BRES O&M corrective action plans, with or without modifications, before the spring of the year. Once a plan is approved



by EPA, corrective action work may begin. Corrective action work must be completed within a calendar year of the date of the original BRES field evaluation.

### 3.2.2 Long-Term Schedule

Because of the large number of response action sites in the BPSOU, BRES evaluations will take place in four-year cycles. Preliminary indications are that there may be approximately 150 BPSOU sites where it may be appropriate to use the BRES. At the outset of the remedial design/remedial action (RD/RA) activities at the BPSOU, the initial list of BRES sites will be developed by EPA in consultation with Montana DEQ and other BPSOU stakeholders. Some of these sites may have only a small portion of reclaimed ground because they have been paved or have had a structure built on them. Site review, and reconnaissance if necessary, should be conducted for all sites to determine the appropriateness of using the BRES.

In addition, unreclaimed sites (i.e., Category 2 and 3 sites described in Section 1.3.2) may be addressed by future RD/RA activities if action levels are exceeded or if they are found to be a source of COCs to surface water (via the Surface Water Management Program). These sites will need to be incorporated into the site list for periodic BRES evaluation after capping or removal actions for these sites are completed.

The large number of sites necessitates dividing them into groups and staggering the BRES evaluations and corrective action activities over a four-year period. A four-year cycle was chosen for two reasons:

- The decision logic for the BRES states that after corrective action work is done on a BRES polygon, that polygon should be evaluated with the BRES three full growing seasons after the corrective action work is completed; a four-year cycle provides the correct timing between the corrective action activities and the recurrent BRES evaluations.
- The division of BRES sites into four groups allows adequate time for pre-assessment preparation and field evaluations during the peak standing biomass period of the growing season. A shorter cycle might not allow enough time to perform evaluations on the number of sites to be completed in a year, and a longer cycle would not provide correct timing between BRES evaluations, as articulated in the BRES decision logic.

All sites in the same group will be evaluated during the same year. Groups should not be split once they are created because of the complications that would arise in BRES scheduling and site tracking. The long-term schedule for the BRES is presented in Table 3-1.



	Summer Following ROD	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
BRES Site Evaluations	Polygon delineation	Group A	Group B	Group C	Group D	Group A	Group B	Group C	Group D	
Corrective Action, if necessary			Group A	Group B	Group C	Group D	Group A	Group B	Group C	Group D
Polygon Boundary Re- evaluation										All Groups

**Table 3-1  
Long-Term BRES Schedule**

Polygon delineation will be completed for all sites prior to the first year of the BRES cycle. Once polygons are delineated at sites, they will remain fixed until the official review period in Year 9 of the BRES process. Re-evaluation of polygons in Year 9 allows two full BRES cycles to occur before polygon boundaries are re-evaluated. The logic behind polygon delineation, including the timing of polygon boundary review, is detailed in Section 4.

### 3.3 Field Crew Training

The BRES Administrator will lead a mandatory one- to two-week field crew training session prior to each field evaluation season. A field manual will be designed and provided to the field crew as a training guide and to assist them with the field evaluation process. Field crew members will also receive software and data management training as needed.

During the training session, field crew members will make quantitative measurements and visual estimates of vegetation and erosional parameters to calibrate themselves to make reproducible estimates of vegetation cover and erosional assessments in the field. Field crew members will also be trained to identify trigger items and correctly record the appropriate information on the field form.

#### 3.3.1 Vegetation

The field crew will be trained to visually estimate vegetation cover on BRES polygons by using a modified point intercept method. The crew will visit several polygons that include a range in percent vegetation cover values. It is recommended that modified point intercept frames of 0.25 square meters (m<sup>2</sup>) be used to quantitatively measure cover. The recommended method consists of laser pointers used in conjunction with a grid of 10 points on a frame. The type of material intercepted by the lasers is recorded and used to determine percent live plant cover, litter, rocks, and bare ground. The frames should be placed using a random method that places the frames over an area large enough to represent variability at the site. If the recommended method is not used, EPA requires that an equivalent method be approved by EPA prior to use.



The number of frames necessary to characterize a polygon changes with the variability among frame placements. If the variability is large, more frames are necessary; when the variability is small, fewer frames are needed to adequately characterize the site mean. The following equation (Bonham 1989) may be used to determine sample adequacy for a two-sided confidence interval.

$$n = t^2 s^2 / (K)^2$$

where:

- n = number of observations needed to obtain an estimate of the true mean within a defined range (e.g. within 10 percent of the true mean)
- t = value selected from t-distribution table
- s<sup>2</sup> = the sample variance
- K = the proportion that includes the difference of the sample mean from the population mean (e.g. within 10 percent of the true mean). K was set for BRES purposes at 10 percent.

Results of the summer 2001 calibration and validation period (CDM/RRU 2003) indicate that between 30 and 50 frames should be placed at a site, depending on variability within a site (polygon).

After an adequate number of frames are placed and the ground cover measured, the field crew should begin to calibrate themselves to the different percentages of cover. The field crew's experience should be tested by making a visual estimate of cover on an area, then quantitatively measuring cover on the same area. Once the field crew can reliably estimate vegetation cover to within ±10 percent, the vegetation portion of the training is complete.

### 3.3.2 Erosion

The field crew will be trained in erosion evaluation using a modification of the BLM erosion evaluation method (BLM 1981). The Calibration and Validation Report (CDM/RRU 2003) explains how the BLM method was customized for use in the BRES. After the initial erosional condition training session, field crew members will calibrate themselves by evaluating several sites that vary in erosional condition. The field crew experience will be tested by scoring erosional condition on different BRES polygons using the BRES Erosion Condition Class Determination guidelines, and then comparing their scores with one another. Once the field crew can reliably rank erosional conditions within ±10 percent of the group mean, the erosion evaluation portion of the training will be complete.

### 3.3.3 Trigger Items

The field crew will be trained to identify trigger items (see Section 3.4.1) and record appropriate information on the field form. The field crew's experience will be tested



during the training session by evaluating an area and then comparing evaluations within the group. If there are discrepancies in trigger item identification, the field crew members and the trainer will discuss these discrepancies, referring to the BRES Field Manual when necessary. Training will be complete when the field crew consistently identifies trigger items.

### **3.4 BRES Field Manual**

As previously discussed, a field manual will be developed to outline training activities. The BRES Field Manual will provide instructions for proper completion of BRES field forms. The following topics will be covered in the BRES field manual:

- Preparation of necessary pre-assessment materials
- Instructions for filling out field forms
- Specific instructions on how to visually estimate ground cover and erosional condition
- Definitions and descriptions of trigger items and other pertinent information associated with each trigger item
- Methods of quality control (QC) on field observations

In addition to field evaluation instructions, the BRES Field Manual will include photographs representing different ground cover values for live cover as well as examples of varying degrees of erosional characteristics.

### **3.5 Field Evaluations**

BRES field evaluations will be performed by scientists experienced with the assessment of vegetation and erosional parameters, and who are trained as described above. The BRES was specifically designed for sites where the response action left mine waste in-place. At these sites, vegetated and engineered cap integrity is critical to ensuring waste does not become exposed. Field evaluations will be completed on all sites designated for the BRES in accordance with a four-year cyclical schedule.

#### **3.5.1 Upland Vegetation Caps**

An erosive cap is unstable and impermanent. If the cover soil comprising the cap erodes to a point where waste material is exposed, COCs may be transported off-site by water or wind, and may come into contact with human or environmental receptors on the site. The vegetation growing in cover soil overlying waste left-in-place serves several purposes critical to the stability and permanence of the protective cap. First, plants stabilize the soil by minimizing water and/or wind erosion. Second, plant foliage provides a greater surface area than bare ground for rainwater evaporation. Third, plants transpire soil water during carbon assimilation. Both of the latter processes minimize infiltration of surface water to the waste material beneath the cap surface. Standing or fallen dead plant material can reduce wind and water erosion and provide an evaporative surface for rain and storm water; however, excessive



plant litter accumulation can retard evaporation and thereby enhance infiltration. In general however, plants and dead plant material act in several ways to minimize surface water percolation and the transport of COCs off-site and to groundwater. Therefore, erosional stability as determined in part by vegetation cover, is critical to a determination of the functionality and permanence of a response action at the BPSOU.

Specific characteristics of a site help identify both localized and polygon-specific cap integrity or stability problems. In the BRES, these characteristics are referred to as trigger items and serve to identify areas of current or imminent cap failures that may cause human health risk because of site conditions. Trigger items of the BRES field evaluation form include:

- Less than 21 percent live cover by desirable species
- Greater than 65 for total erosion evaluation score
- Significant difference between site edges and interiors
- Exposed waste material
- Bulk soil failure, land slumps, or subsidence
- Barren areas
- Gullies

Each of these trigger items is explained in detail in Section 6.

### **3.5.2 Engineered Cap Evaluation**

Engineered caps are constructed using standard engineering materials, as compared to coversoil caps, which are constructed using only cover soil and vegetation. Engineered caps include rip-rap, rock covers, concrete, shotcrete, asphalt, and dirt parking lots or trails. Because engineered caps function as a barrier in areas to which the public has access, it is critical that they remain protective and functional.

A checklist for engineered cap integrity has been developed for use by BRES field evaluators (Appendix F). This checklist will be used during site evaluations when engineered caps are present. Information on this checklist will be entered into the BRES database.

### **3.5.3 Residential Yards and Playgrounds**

The BRES evaluation does not include residential yards or playgrounds. Response actions on these areas are covered in the Butte-Silver Bow County Residential Lead Abatement Program.

### **3.5.4 Riparian Area Evaluation**

The BRES does not include the evaluation of riparian areas; these exist along Silver Bow Creek, and Blacktail Creek within the BPSOU. Only response actions completed



in the upland areas of the BPSOU are included in the BRES. If deemed necessary by EPA, a response action decision tool will be developed for these areas. Montana State University's Riparian Evaluation System, which was developed for use on the Clark Fork River, could be modified for use in riparian areas at the BPSOU.

### **3.6 Annual Maintenance Evaluation**

Butte-Silver Bow County personnel currently perform annual maintenance evaluations on BPSOU response action sites. These maintenance evaluations are different from the BRES evaluations. Maintenance evaluations ensure that sites are safe and remain well-maintained by evaluating the following parameters:

- Weeds
- Security
- Debris
- Fire potential
- Adjacent areas
- Signs and fences
- Drainage ditches
- Run-on
- Other

To improve efficiencies, EPA and the PRP Group have discussed conducting maintenance evaluations and the BRES evaluations at the same time for those sites that are scheduled for both. However, until this approach is agreed upon, these evaluations will be conducted separately.



## Section 4 Polygon Delineation and Use

Prior to implementation of the four-year BRES cycle, polygon delineation must be completed. This procedure is described in this section.

### 4.1 Polygons

Because a variety of land units may lie within the same politically bounded site, it would be impossible to assign a meaningful score to the site as a whole. Thus, to improve the precision (or repeatability) of BRES estimates, sites will be divided into smaller land units based upon factors such as vegetation homogeneity, slope angle and aspect, and land type, which might include residential lawns, parking lots, open space, and driveways. These smaller units will reduce within-polygon variability with respect to BRES parameters and thereby increase scoring precision. For example, polygon lines would separate a lawn from a reclaimed grassland area or dirt parking lot. A site that has been reclaimed with rangeland vegetation but has differences in aspect or slope may also be subdivided into polygons because these differences can control site vegetation and erosional characteristics.

Using polygons, the average score within a polygon will describe the actual conditions more precisely than it would if the parameter had a large range. For example, if the vegetation cover in a polygon ranges between 30 and 45 percent, an average reported value of 37.5 percent would describe that stand of vegetation in a way that is useful and interpretable by site managers. Conversely, if the vegetation cover at a site ranges between 10 and 75 percent in different areas, an average value of 42.5 percent does not describe the site in a useful manner.

A larger range in potentially measured values will result in a larger range in the estimated values among observers. If the vegetation cover ranges between 10 and 75 percent at a site, one observer might focus their attention on the parts of the site with less cover while another observer focuses on an area with greater cover. Both observers would have assigned the site vegetation cover a number that they thought was representative. However, these estimates are different because of the wide range of potential conditions to measure. This inconsistency decreases the usefulness of the data for the decision makers. Polygons block the land into more internally homogeneous units and thus increase the repeatability of estimates made for each of the parameters. This increase in repeatability has been observed by researchers working with similar evaluation systems and other statistically based sampling techniques like stratification (BLM 1981); (Hansen 1995); (CDM/RRU 1999); (BLM 2000).

#### 4.1.1 Polygon Delineation Process

Polygon delineation will occur once every nine years. After two full BRES cycles, polygon lines will be re-evaluated and altered if needed. Initial polygon delineation will occur upon completion of the ROD as an Agency-led project with PRP Group interaction. Logistically, polygons will be delineated in two steps. First, aerial



photographs will be reviewed in the office to pinpoint specific areas within a site that might differ from each other with respect to land use, erosional characteristics, and/or vegetation cover. Using GIS software, tentative polygon lines will be drawn on the aerial photograph and the preliminary site map will be printed for field use. The preliminary polygon lines are tentative indicators to the field crew about potentially different areas within a site. Aerial photographs are limited because they are a snapshot in time of a dynamic system. Nonetheless, they are an essential preparatory step in polygon delineation. The field crew should also review post-response action information (e.g., as-built drawings) for each site and any other previously collected information. This information/data will support or refute observations in the field and direct the polygon delineation process.

Following the office preparation phase, field crew members will visit each site, bringing with them all preliminary materials. They should walk over the entire area and note differences in land use, vegetation, erosional characteristics, existence of barren areas, and the size of the affected areas. If site conditions differ from aerial photographs, these differences should be noted on the printed aerial photographs. Upon completion of the site reconnaissance, polygon lines will be mapped using a resource-grade GPS with sub-meter accuracy. If necessary, polygon boundary lines will be modified in the GIS program to accurately represent any changes the field crew made to polygon boundaries.

#### **4.1.2 Polygon Delineation Guidelines**

1. Vegetation Cover. If vegetation cover varies distinctly across a site, then a polygon boundary shall separate the different areas. Variations in cover may be caused by differences in reclamation techniques, cover soil quality, slope angle, aspect, weed invasion, or plant species. The term distinct in this case is defined by the vegetation cover classes used in the BRES. The cover classes are less than 21 percent, 21-40 percent, and greater than 40 percent live plant cover. Separate polygons should be delineated if the percent vegetation cover between the two areas:

- ▣ differs more than 15 percent, or
- ▣ crosses the threshold between the middle and lower cover classes

If there is not a sharp line of demarcation between the two different areas, best professional judgment should be used when determining the polygon boundaries.

2. Erosion. If erosional condition varies distinctly across a site, then a polygon boundary should separate the different areas. Differences in erosional condition can be caused by differences in slope or vegetation cover within a site. The term distinct in this case is defined by the erosional condition threshold value of 55 points. Areas should fall into two different polygons if the erosional condition score:



- differs more than 20 points, and
- crosses the threshold score of 55 points

If there is not a sharp line of demarcation between the two different areas, then best professional judgment should be used when determining the polygon boundaries.

3. Barren Areas. Parts of a site with a high frequency of barren areas should be culled out as individual polygons from areas of generally better vegetation. A barren area is defined as an area at least 75 square feet (ft<sup>2</sup>), with less than 10 percent total vegetation cover. Rock outcrops do not count as barren areas. If a polygon is delineated because of barren areas, the barren areas should cover at least 25 percent of that polygon. These barren area polygons will allow for representative vegetation cover estimates in both the more barren and better vegetated polygons.
4. Land Form or Land Use. Polygons should be delineated based on differences in landform or land use. For example, engineered caps, ditches (including grass-lined swales), sedimentation ponds, parking lots, gravel trails, playgrounds, asphalt parking lots, and manicured lawns should be separated from each other and from reclaimed open areas by polygon boundaries.
5. Size. Minimum size guidelines for polygon delineation were identified during the calibration and validation period in 2001. Because a predetermined minimum size might interfere with professional judgment during the polygon delineation process, size criteria should be used as a guideline, not a specified requirement. As a guideline, a polygon should generally encompass an area greater than or equal to 10 percent of the site. The size guideline was established to prevent the BRES from incurring an excessive number of polygons.
6. Variable Vegetation Cover or Erosion. Some sites have variable vegetation cover and erosional conditions at small scales, while other sites have large internally homogenous areas that differ from other large areas of the site. When the variation or patchiness occurs at scales that are smaller than 10 percent of the site, or when the entire site is covered by small-scale variability, then the smaller areas of difference should not be broken into separate polygons. Effort should be made by the field crew to obtain the best average vegetation and erosion estimates possible. These variable or patchy polygons provide the most difficult areas to average. Often, repeatability decreases in these patchy polygons. Nonetheless, if the variability occurs at a scale so small that too many polygons would be created at a site, then the best option is to lump all of the small patchy areas into a larger polygon.

### 4.1.3 Alteration of Polygon Boundaries

Once established, polygon boundaries should only be altered using the mechanisms outlined below. It is anticipated that as system implementation begins, there will be more polygons, but as time passes and polygons are brought up to BRES standards,



some polygon boundaries will become irrelevant and will therefore be removed. Some polygon lines will exist for longer periods because they signify a significant break in conditions, such as a steep slope and a flat area. Some polygon lines would remain indefinitely, such as those between a rip-rapped slope and a revegetated grassland area. If new polygons need to be added, they should be delineated as outlined above.

Polygon boundaries will undergo re-evaluation nine years following implementation of the BRES. By year nine, two BRES evaluations will have been completed on all polygons.

During the summer prior to polygon re-assessment, it will be necessary to take a new set of aerial photographs. During re-evaluation, the field crew should follow a process similar to that outlined above. Existing boundaries that appear questionable, based on the aerial photograph will be highlighted. In the field, the survey crew will walk all existing polygon lines and make notes as to whether they are still appropriate or need to be changed. Upon completion of the site reconnaissance, the new polygon lines will be mapped using a GPS with sub-meter accuracy. Polygon boundary lines will be modified in the GIS to accurately represent any changes the field crew made to polygon boundaries.

EPA recognizes that the delineation and re-evaluation of polygons at all sites at one time will be a concentrated effort. Nonetheless, the complete re-evaluation of polygon boundaries in one field season every nine years will have several benefits. First, aerial photographs, taken the year before the re-evaluation, will be current for all sites. Second, a specific field crew can be hired on a seasonal basis once every nine years and trained to perform this task. Third, the evaluation, management, and tracking of polygon boundaries will be easier if done at one time.

#### **4.1.4 Annual Maintenance Evaluation and Polygons**

The annual maintenance evaluation (see Section 3.5) will be performed each year on a site-by-site basis; the maintenance evaluation will not be performed for each individual polygon. The site-based approach for the maintenance evaluation was chosen because the questions asked during the maintenance evaluation should not vary within a site. For example, the fences are designed to surround the site based on political boundaries and will not change on a polygon basis within the site.

### **4.2 Parameters Estimated by Polygon versus by Site**

Percent ground cover estimates and erosional condition assessments require a homogenous area for evaluation; therefore, polygons are required for evaluation of these two parameters.

Some parameters can trigger an action and do not require a homogenous area for evaluation; therefore, they are recorded on a site basis and not by individual polygons. These localized trigger items evaluated on a site basis include:



- Significant difference between site edges and interiors
- Exposed waste material
- Bulk soil failure/land slumps/subsidence
- Barren areas
- Gullies

Regardless of the number of polygons, only one BRES field form should be used per site during the field evaluation. In addition to recording the trigger item on the field form, the evaluators should outline and label the area of the trigger item on the aerial photograph. If barren areas are observed on a site, the polygon in which they are located should also be noted on the field evaluation form. Each of the individual trigger items is described in detail in Section 6.



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## **Section 5 Methods and Procedures**

### **5.1 Office Preparation**

Prior to the field season, the BRES Administrator shall prepare field assessment packets for the field crew. The contents of these packets are detailed in the sections below.

#### **5.1.1 Field Forms**

The BRES Administrator shall include one field form (Appendix D) for each site in the site assessment packet. To reduce the time spent filling in field forms, field packets will include forms that have been prepared specifically for each site. Static information should be filled in automatically using a mail merge from the Reclamation/O&M database. The following fields should be completed prior to the field visit:

- Site name and number
- Number of polygons
- General slope angle and aspect of site

#### **5.1.2 Aerial Photographs**

Field packets will also include aerial photographs prepared specifically for each site. The aerial photograph should be printed on a standard 8.5" x 11" page. The GIS database should be used to add the following information to each aerial photograph:

- Site boundaries
- Polygon boundaries
- Site name and number
- Contour lines (where useful)
- North arrow and scale bar
- Month and year of the aerial photograph
- Site acreage
- Special features such as storm drains, shaft caps, channels, informal sedimentation basins, etc.
- Blank space for day, month, and year of evaluation (to be filled in by evaluator)
- Blank space for evaluator's initials



During the site evaluation, aerial photographs will be used to identify and label the location of trigger items. At the completion of the field evaluation, aerial photographs and field notes should be submitted to the BRES Administrator along with the completed site evaluation field form.

### **5.1.3 Supplemental Information**

Any other data relevant to the evaluation of the site should also be included in the field assessment packet. These data may include dates and details of previous response actions (e.g., cover soil depth and seed mix) and maintenance activities (e.g., weed spraying). Office preparation of field packets should be completed each year during the winter and early spring.

## **5.2 Field Survey/Site Evaluations**

The field survey will occur each summer. Field evaluation of the BRES sites scheduled for evaluation that year should take place between late June and early August, during peak standing biomass. The BRES Administrator will lead the BRES evaluation process. EPA, with assistance from the state, will provide oversight as deemed necessary. Other stakeholders may participate in the BRES process, if they desire.

## **5.3 Data Transfer and Database Management**

Currently, data from the field are being entered and stored in databases managed by ARCO and BSB County; these are ARCO's reclamation database and BSB County's GIS and O&M databases. In the future, new data will be submitted to the BRES Administrator upon completion of fieldwork and then entered into the appropriate database. Database management issues will be refined after completion of the ROD. ARCO is currently developing a data management plan, which will include the BRES.

GIS will be an important component of data management and a GIS file should be created to document the location of trigger items. This polygon layer or shape file should be digitized from notes on the aerial photographs and should track locations of the trigger items and information about them, such as date identified and other information from the field form. A new GIS trigger item layer file should be made at the beginning of every four-year BRES cycle.

A subset of the total data in the BPSOU databases will be exported into GIS format. This information might include, but will not be limited to:

- Soil analytical data
- Vegetation information: species observed, weeds, and percent vegetation cover (method, observer, year)
- Present and past erosion information
- Maintenance activities



- Response action history
- Cover soil depth
- As-built information

## 5.4 Quality Control Program

A QC program will be instituted to ensure integrity of data used to make management decisions. Two main areas in which data quality will be enforced are vegetation cover and field data transfer.

### 5.4.1 Vegetation

Visual estimates of plant cover are often preferred in applied contexts for their rapidity. Unfortunately, visual estimates of ground cover are subject to error or potential bias by the person or persons making the estimates. To decrease the range of inter-observer variability in visual estimates, the BRES uses QC protocol.

BRES QC consists of comparing quantitative measurements of ground cover to visual estimates. At the end of each week during the field evaluation season, 10 percent of the polygons evaluated that week will be randomly chosen and then quantitatively measured using the modified point intercept method. If the precision target has not been met, the previous week's site must be reevaluated. Because QC measurements are made weekly, the field crew is continuously able to compare visual estimates with measured values, thus maintaining a level of calibration that allows them to make precise visual cover estimates throughout the field season. Refer to the earlier discussion of the use of the laser point intercept method in Section 3.3.1.

### 5.4.2 Field, Analytical, and Spatial Data

QC for BRES data is necessary to ensure all data are useful (i.e., accurate) for their intended purpose and properly entered into the databases. Several mechanisms should be used to enforce data quality for the BRES.

Data from the field forms should be verified once they have been entered into the database(s). Optimally, a person other than the person who entered the data would check each entry from the field forms to ensure that the data are correct. If a different person is unavailable, then the original person should enter all data, then check the correctness of all data, in two different steps. This QC step ensures that transcription errors are corrected before data are finalized in the database and disseminated to other users.

When soil or waste materials are analyzed, the quality of the analytical data should be assessed using the validation procedures documented in the Clark Fork River Superfund Site Investigations Data Management and Data Validation Plan (ARCO 2000). Once validation has been performed, data are assigned the following QC codes:

U - Undetected (below the detection limits of the analytical instrument)



E - Enforcement quality data

S - Screening quality data

These QC codes should always be included in the database(s) with the analytical data, so that the quality of the analytical data can always be interpreted by the end user(s).

Spatial data are information associated with a location in space and will be tracked in the GIS database. This information will be input to GIS through either digitization of field notes on aerial photographs or from a GPS survey. Information digitized from aerial photographs will be somewhat imprecise due to the evaluators' limitations with aerial photograph interpretation in the field. Information from a GPS instrument is usually more precise than from a digitized photograph and care should be taken to enforce this precision in several steps. First, GPS-obtained data must be differentially corrected. Second, any points or lines generated with a GPS should be "ground truthed" by projecting the data over an aerial photograph and/or comparing the GPS results of known reference point in the field. If a hand-held GPS unit is being used to mark locations, then the user should ensure that the unit is triangulating from an adequate number of satellites in appropriately distant positions (the number and position of satellites can be checked easily on most units.) The metadata for the GIS files should track how the data were positioned spatially in the system (i.e., GIS or digitized by hand) and the datum to which the points or lines are referenced.



## Section 6 Evaluation Parameters

This section defines the BRES field evaluation parameters. For greater detail about how each parameter was selected, please refer to the BRES Calibration and Validation Report (CDM/RRU 2003). A detailed discussion of the decision logic developed by the Technical Group for each parameter is presented in Section 7.

### 6.1 Ground Cover

Ground cover estimates are used in the BRES as an indicator of the condition of upland vegetation caps. Because ground cover assessments require a homogenous area for evaluation, ground cover is evaluated on a polygon-by-polygon basis, not on an entire site basis. Although several ground cover parameters are estimated at each polygon, percent live vegetation cover is the most critical and is therefore used more extensively in the decision-making process than the other parameters.

#### 6.1.1 Live Cover

Percent live cover refers to the percentage of ground surface covered by the current season's plant growth; exceptions include UWS and noxious weeds, which are defined below. Standing plant material from the current year (i.e., live, dead, or senescent) should be included in the estimate of percent live vegetation cover. During the 2001 calibration and validation period, raw data collected and analyzed indicated that the potential for additive errors in ground cover estimation was less when only live cover estimates were used for site evaluation. Therefore, BRES field personnel should estimate and record all of the vegetation parameters on the field form (Appendix D), but only percent live vegetation cover of desirable species will factor into the decision-making process. The other ground cover values recorded on the field form should be considered if future corrective action is required at the site.

Percent live vegetation cover of desirable species will be used as a trigger item in the BRES. If the evaluation determines that there is less than 21 percent live cover of desirable species, this lack of desirable vegetation triggers a recommendation for additional action at the polygon.

#### 6.1.2 Litter

Litter is defined as the uppermost layer of organic debris composed of dead plant material from previous year's growth or other slightly decomposed organic materials. The BRES definition of litter also includes moss and straw mulch. Litter is recorded on the field form because it might have utility in the decision making process regarding potential corrective action at a site. Litter does not count toward the percent live cover estimate, and is not a trigger item.

#### 6.1.3 Undesirable Weedy Species

UWS are plant species that are acceptable for BPSOU sites in small numbers, but are considered undesirable in large numbers. UWS are identified on the Vegetation



Species Grouping for the BPSOU list (Appendix G). UWS are plants with certain life history characteristics that could undermine the integrity of the response action at the site. For example, the UWS might be shallow rooted, or have a short seasonal, annual or biennial life cycle; characteristics that reduce the stability of a vegetation cap. In the BRES, UWS can only count for up to 5 percent of the total cover on the site. For example, if 10 percent of the site is covered by *Kochia scoparia* and 20 percent is covered by this year's growth of desirable species, then the total live cover estimate would be 25 percent.

#### **6.1.4 Noxious Weeds**

Noxious weeds are defined as all plants on the state and county noxious weed lists (Appendix H). Noxious weeds are those regulated by law or those that are difficult to control. In general, noxious weeds are non-native plants that compete with desirable plants for nutrients, water, and/or space. Noxious weeds do not count towards the estimate of percent live vegetation cover, and do not serve as a trigger item. The percent cover by noxious weeds should be estimated in the field and recorded in the BRES database so that appropriate O&M measures can be taken to reduce the weed infestation.

#### **6.1.5 Rocks**

During the calibration and validation period, the Technical Group decided that rocks less than 2 inches in size do not contribute to erosion protection, whereas rocks greater than 2 inches may provide some degree of erosion protection. For BRES purposes, therefore, rocks are defined as any solid material greater than 2 inches on at least one side. Material smaller than 2 inches should be considered bare ground when estimating total ground cover. The percent of the polygon covered by rocks should be recorded on the BRES field form and considered when planning corrective action at a site.

### **6.2 Erosion**

The BRES uses a modified version of the BLM Erosion Classification System (BLM 1981). During the calibration and validation process, the Technical Group added greater detail and specificity to the original BLM category descriptions. During BRES site evaluations, the field evaluator should refer to the BRES Erosion Condition Class Determination guideline (Appendix I), and then record scores for each erosion parameter on the BRES field evaluation form. In the BRES, a score of 55 or greater triggers a recommendation for action at a polygon. Because erosional condition assessments require a homogenous area for evaluation, erosion is evaluated on a polygon-by-polygon basis, not across an entire site.

### **6.3 Site Edges**

The edge of a site can be either inside or outside the boundary of a response area. Differences between site edges and the interior of the site are included as a trigger



item on the field form and should be evaluated by site, not polygon. Several factors might cause differences between the site interior and the site edge:

- Cover soil may be thin around the site edges, which may cause stressed and sparse vegetation or lack of successful establishment of desirable vegetation due to a lack of adequate rooting depth for desirable plant species.
- Increased erosion at site edges due to run-on from a street, alley, storm water ditch, sidewalk, and/or adjacent property. Site edges may also be steeper than the majority of the site, which may increase erosion due to run-off.
- Unfenced site edges that experience more traffic, especially when there is no adjacent sidewalk. This foot or bike traffic reduces the ability of the vegetation to persist.
- Rock layers around the edges of a site.

Whether a difference between a site edge and the site interior is significant enough to note on the field form will rely, to some degree, on the evaluator's professional judgment. In order to guide the process of site edge difference identification, check box categories are listed on the field form. The purpose of the check boxes will be to guide the evaluator's interpretation of the potential differences in the site edge. Check box parameters are:

- Lime rock barriers
- Increased weeds
- Increased erosion
- Gullies
- Depositional area
- Steeper slope
- Less vegetation
- Other

The items listed above should serve as a guide to be used by BRES field evaluators to identify differences between the edges and interior of a site. If differences are identified at a site and the check boxes on the form have not accounted for these differences, the evaluator should note the differences on the field form. In addition to check boxes, the field form has a space for the evaluator to estimate the width of the affected area. The evaluator should also draw an outline of the affected area on the aerial photo and label it appropriately.



## 6.4 Exposed Waste Material

Exposed waste material includes mine tailings and waste rock, as well as any soils that have been contaminated by metals, arsenic, or acid material from mining operations in the BPSOU. When the chosen response action is a vegetated soil cap over waste left-in-place, exposed waste material indicates some failure of the cap material to provide adequate cover and an increased potential for human or environmental receptors to come into contact with COCs. The existence of exposed waste material at a site is considered a trigger item; this should be recorded on the BRES field evaluation form and the area outlined and labeled on the aerial photograph.

## 6.5 Bulk Soil Failure or Mass Instability

Bulk soil movement or mass instability indicates a current or potential for underlying waste material to become exposed. If these situations are identified at a site, the BRES field crew should record this information on the BRES field evaluation form and the area should be outlined and labeled on the aerial photograph. The field form also has a check box for the existence of subsidence at a site, even though subsidence is the responsibility of the landowner and is not a CERCLA issue. Evidence of subsidence will be recorded in the BRES database and BSB County personnel will be notified.

## 6.6 Barren Areas

Barren coversoil can lead to increased erosion and may compromise cap integrity. Barren areas may be considered BRES trigger items if they are:

- Greater than 75 ft<sup>2</sup> in area
- Have no more than 10 percent total plant cover (live cover + litter) on the area

Barren areas do not include rock outcrops. If the barren area(s) meets the above conditions, the field crew should record the number of barren areas, whether barren areas cover over 25 percent of the site (see Decision Logic – Appendix C), and in which polygon the barren area(s) are located. In addition, the approximate location of the barren area(s) should be outlined and labeled on the aerial photograph. Barren areas are to be included in the erosion evaluation and the estimation of live plant cover for the polygon.

## 6.7 Gullies

The presence of gullies indicates that soil loss by water erosion is occurring or has occurred in the past, which increases the chance of exposing covered waste material. An active gully has unstable sidewalls with little or no vegetation or recent soil loss by erosion. Active cutting, sometimes referred to as “head-cutting”, may be occurring at the up-gradient end of the channel. If a gully is actively eroding it may jeopardize the stability of the vegetation cap and is therefore considered a trigger item.



Conversely, a healing gully is identified by the reestablishment of vegetation on the sidewall and reduction in soil loss in the channel bottom. A healing gully is not considered a trigger item, but the presence of a healing gully and its physical characteristics (depth and length) should be noted on the BRES field form and the location outlined on the aerial photograph. The location of gullies will be tracked in the GIS and O&M databases.

## **6.8 Field Evaluation - Riparian Lower Area One**

EPA conducted an Expedited Response Action for LAO between 1992 and 1997 that included the removal of mill tailings and manganese stockpiles, and the importation of backfill material and revegetation. In addition, a ground water collection and treatment system was constructed as part of the LAO response action. The final configuration for this area will be determined during RD/RA.

The approach to reclamation at LAO differed significantly from that applied to the uplands in Butte. In LAO, waste material was excavated in and around Silver Bow Creek to a specified design contour interval and cover soil was brought in to replace the contaminated soil. The only waste remaining in LAO is located under the slag walls and water treatment plant, or at significant depth (8-10 feet). In contrast, upland BPSOU response action areas have waste left-in-place. For LAO, the concerns are managing and treating contaminated groundwater, maintaining the integrity of the reconstructed stream channel, and preventing potential down cutting of the channel in flood events that may expose deeply buried mine waste material.

The BRES methodology was customized for the uplands and therefore is not applicable to evaluate LAO. A separate O&M plan will be developed by EPA and the PRP Group specifically for LAO to ensure that the response actions function as designed.



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## Section 7 Corrective Action Triggers

A decision logic diagram has been developed for each trigger item in the BRES. During the calibration and validation period, Technical and Management Group members agreed upon the logic that should be followed if a BRES evaluation identifies a trigger item at a polygon or site. The decision logic for each parameter follows; decision logic diagrams are included in Appendix C.

### 7.1 Polygon-Based Parameters

#### 7.1.1 Vegetation

The logic diagram for the vegetation cover category makes distinctions among the three live vegetation cover categories.

1. For polygons that fall in the lowest live vegetation cover category (less than 21 percent), the site must undergo either VI or RI. The VI or RI should be completed on the polygon within a calendar year of the BRES evaluation and the polygon should undergo another BRES evaluation three years following corrective action work (i.e., back on the four-year BRES evaluation cycle). If a site undergoes VI, and then falls into the less than 21 percent live cover category again during any future BRES evaluations, the polygon is then required to undergo RI, in order to meet the BHRS.
2. For polygons that fall into the middle live vegetation cover category (21-40 percent), UWS are considered. If greater than 10 percent of the polygon is covered by UWS, VI will be implemented on the polygon. If less than 10 percent of the area of the polygon is covered by UWS, the polygon should undergo a regularly scheduled BRES evaluation in four years.
3. Polygons that fall into the upper vegetation cover category (41-100 percent) should be re-evaluated in four years.

#### 7.1.2 Erosion

If the erosion evaluation score is 55 or less, no immediate action is required and the polygon will continue on the regular BRES evaluation schedule of every four years. A score of greater than 55 triggers a recommendation for corrective action. An engineering assessment on the erosional and flow patterns shall be performed to determine the appropriate type of corrective action needed to reduce erosion. The approved corrective action plan should be implemented within the calendar year. The area repaired should be monitored at least yearly and preferably also after large storm events. If the erosion control actions are failing, the site should be repaired immediately. The polygon will undergo a full BRES evaluation three years following the corrective action work.



## **7.2 Localized Trigger Parameters**

### **7.2.1 Site Edges**

The site edge parameter is primarily a monitoring category, except when gullies or exposed waste materials are present. Gullies or exposed waste material along the site edge trigger corrective action to repair the gully, and remove or cover the exposed waste material. Corrective action work should be completed within a calendar year of the BRES evaluation and then undergo a full BRES evaluation three years following corrective action work (i.e., back on the four-year BRES evaluation cycle).

If neither gullies nor exposed waste exist, yet a significant difference has been identified between the site edge and the site interior, the area should be tracked in the GIS and O&M databases for future trend analysis to determine whether site edge condition is improving or declining. These sites shall undergo a regularly scheduled BRES evaluation in four years.

### **7.2.2 Exposed Waste**

Exposed waste on a site triggers corrective action. An engineering assessment shall be performed on the area of exposed waste to determine the appropriate type of action needed to repair the cap. The approved corrective action plan must be implemented within the calendar year. The site shall undergo a full BRES evaluation three years following the corrective action work.

### **7.2.3 Bulk Soil Failure or Mass Instability**

Signs of bulk soil failure or land slumps trigger corrective action. An engineering assessment shall be performed on the area to determine the appropriate type of action needed to repair the cap. The approved corrective action plan must be implemented within the calendar year. The area repaired should be monitored after large storm events until the next BRES evaluation, which should be completed three years following the corrective action work. If the corrective actions are failing, the area must be repaired immediately. If subsidence is present on site, then BSB County should be notified so that appropriate actions can be taken.

### **7.2.4 Barren Areas**

If barren area(s) are located within a polygon but cover less than 25 percent of the polygon, a VI plan and/or a RI plan shall be developed to repair only the barren area(s). All pertinent historic data or recent management records should be reviewed prior to plan development. If no usable data or records exist, these data gaps should be filled prior to completion of the corrective action plan. If a VI plan is implemented and the next BRES evaluation indicates that the VI actions failed, the barren areas must be reclaimed in accordance with the BHRS.

If barren area(s) cover over 25 percent or more of a polygon, the same decision logic is used, except that the VI plan and/or RI plan must include the entire polygon, not just the barren areas. If a VI plan is implemented and the next BRES evaluation indicates



that the VI actions fail, a RI plan must be developed and approved and the entire polygon must then be reclaimed in accordance with the BHRS.

Under each of the above circumstances, the corrective action must be completed within a calendar year of the BRES evaluation and the polygon should then undergo a full BRES evaluation three years following completion of the corrective action work.

### **7.2.5 Gullies**

If a gully exists within a polygon, it should be noted on the field evaluation form whether the gully is actively eroding or healing. If the gully is healing as defined by the BRES, no immediate action is required and the polygon will continue on the regular BRES evaluation schedule of every four years. If gullies within the polygon are actively eroding, corrective action is recommended. An engineering assessment on the gullies should be performed and an approved corrective action plan to repair the gullies should be implemented within the calendar year. The area repaired should be monitored at least yearly and preferably also after large storm events, until the next BRES evaluation (three years following completion of corrective action work). If the corrective actions are failing, the area should be repaired immediately.



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## Section 8 Recommendations and Action

### 8.1 BRES Technical Report

At the end of each BRES field season, the BRES Administrator shall prepare an annual report summarizing the field season activities, findings, and recommendations for actions in accordance with the requirements of this plan. The BRES Technical Report shall include:

- A summary of each site evaluated
- Date of the evaluation
- Aerial photograph with GIS overlay of trigger items identified
- A brief discussion of the site conditions and trigger items
- Recommendations based on the BRES decision logic

A BRES summary sheet that lists pertinent information shall also be developed for each site. A conclusion section should be included at the end of the report that summarizes the overall findings of the field evaluation season. Table 8-1 below is an example of a summary table.

Total No. of Sites Evaluated	50	<b>Trigger Items Identified at Each Site (Polygon)</b>						
Total Polygons	73							
Total Trigger Items	10							
Sites with trigger items:		Vegetation	Erosion	Site Edges	Exposed Waste	Soil Failure	Barren Areas	Gullies
Site # 1, Polygon A	1		1					
Site # 6	1				1			
Site # 7	3	1		1	1			
Site # 14	2	1	1					
Site # 22, Polygon C	3		1				1	1

**Table 8-1**

**Example: Overall Findings from One BRES Evaluation Period**

The conclusion section shall also include the schedule for development of the SAP(s) (if collection of analytical data are required), estimated date of data collection, estimated date of annual site corrective action plan(s) completion, and schedule of completion of corrective action work. Relevant information, such as field forms, should be attached to the BRES technical recommendation report.



## **8.2 Management Review of Technical Report**

Upon completion, the BRES technical recommendation report will be reviewed by the Management Group. When reviewing the report for each site/polygon, the Management Group should incorporate any site specific modifying criteria deemed necessary for making decisions that are logical from a management standpoint. For example, a polygon located in a privately owned site has less than 20 percent live vegetation and is used as a parking area. The Technical Group follows the BRES decision logic diagram, and recommends VI or RI at the polygon. The Management Group may decide on a different action after taking into consideration the modifying criteria (in this case land use and property ownership).

## **8.3 BRES Corrective Action Directives Report**

After a complete review of the BRES technical report, the Management Group will make corrective action directives for work. This report should be an EPA lead and should incorporate appropriate Management Group comments and modifications to the technical recommendations report. The BRES corrective action directives report should contain the decisions made by EPA about the corrective action work to be completed at each site/polygon at which trigger items were identified. This includes recommendations for conducting an engineering assessment, more complete vegetation analyses, soil analytical work, and/or the assessment of the need for storm water controls. This document will also be used to guide the PRP Group during development of a SAP for the collection of any environmental data needed to follow the BRES decision logic. These environmental data along with available historical data will be used to produce an annual site-specific corrective action plan.

## **8.4 Annual Site-Specific Corrective Action Plan**

Annual site-specific corrective action plans will be developed each winter by the PRP Group, in accordance with the Directives Report. As mentioned above, several activities must be completed prior to development of this plan for sites that were assessed using the BRES.

- All BRES site evaluations scheduled for that year must be completed and information entered into the database.
- Based on the BRES evaluations, a technical recommendations report should be completed by the BRES Administrator.
- The Management Group should review the technical recommendations report and incorporate relevant modifying criteria into recommendations. A new report will be produced by EPA, which will consider the Management Group's input. This report directs future actions on sites/polygons with trigger items and justifies any deviation from the recommendations made by the Technical Group. This report should be titled BRES Corrective Action Directives Report.



- The PRP Group should review the BRES corrective action directives report and develop a site-specific SAP(s) for collecting additional environmental data relevant to future corrective action work. The SAP(s) must be approved by the EPA prior to sample collection. EPA will have the opportunity to provide sampling oversight, if desired.
- After environmental and historical data have been collected and compiled, the PRP Group will develop site-specific work plans to address the deficiencies identified at specific sites during the BRES evaluation. The work plans will describe the VI or RI work that is proposed to complete the corrective action. These work plans must be reviewed and approved by the EPA. Site-specific work plans will be prepared as addenda to the BRES O&M Plan and will be filed and tracked on a site-by-site basis.
- Following EPA approval, corrective action work may commence on BRES sites/polygons where trigger items were identified. Corrective action work should begin as early in the spring as possible so that all sites/polygons requiring work can be completed during the same field season. This is important because sites/polygons requiring corrective action work will be scheduled for the next BRES evaluation in three years (i.e., on the four-year BRES cycle). The BRES evaluation schedule is strict so that all sites evaluated in the same year will always be evaluated together. For example, if sites A, B, and C are evaluated in 2004, the next time sites A, B, and C will be evaluated is 2008, whether corrective action work is conducted on the site/polygon. Therefore, if corrective action work is not completed on a site/polygon during the calendar year following the BRES evaluation, it will not have three full growing seasons to heal.



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## Section 9 Future Activities

Future activities include:

- Finalizing the list of response action sites that will be included in the BRES program
- Determine schedule for taking new low-level aerial photographs
- Polygon delineation
- Completing the BRES Field Manual
- Developing a long-term O&M plan for LAO (if needed)
- Testing the engineered cap integrity checklist and evaluating these caps
- Designing and implementing a data management strategy to ensure accurate and complete tracking of BRES information

Polygon delineation will occur with technical representatives of EPA present. The field team delineating polygons should be skilled in the assessment of vegetation and erosion, especially at reclaimed sites. The field team should use the guidelines provided in this document to decide upon formal boundaries for polygons. Up-to-date aerial photographs should be procured for the polygon delineation process.



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## Section 10 References

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- CDM 1997. Final Field Survey of Unreclaimed Areas Summary Report. BPSOU, Butte-Silver Bow County, MT. Prepared for EPA by CDM.
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- PRP Group 1996b. Field Survey of Previously Reclaimed Areas Site Inspection Protocol.
- PRP Group 1997a. Technical Memorandum: Field Survey of Previously Reclaimed Areas.
- PRP Group 1997b. Response Action Work Plan Addendum for the Previously Reclaimed Areas Operation and Maintenance.
- PRP Group 1997c. Response Action Work Plan Addendum for the Previously Unreclaimed Areas 1997.
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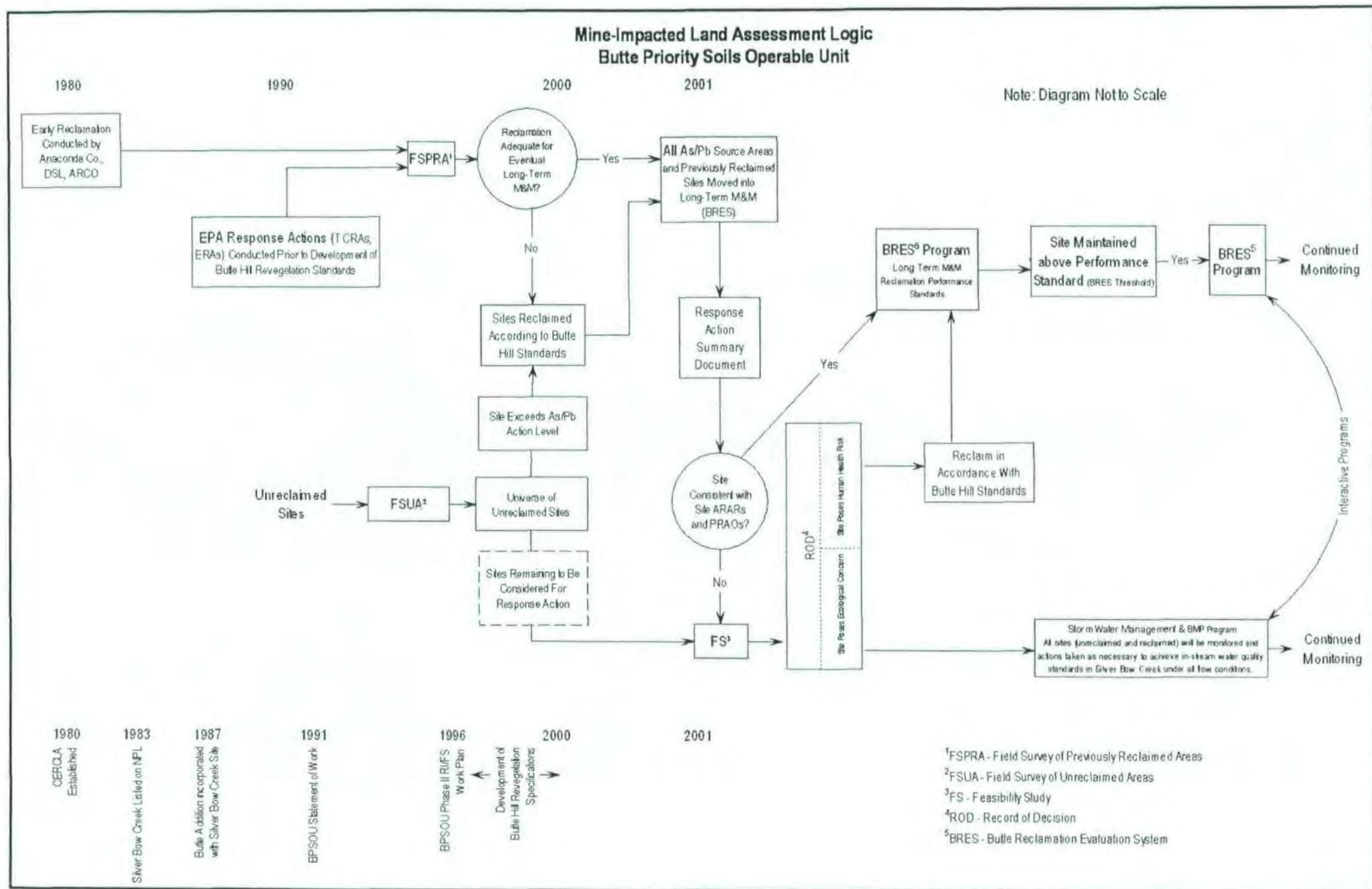
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## BRES Appendix A

### Mine Impacted Land Assessment Logic







## BRES Appendix B

### Butte Hill Revegetation Specifications



**BUTTE HILL REVEGETATION SPECIFICATIONS**

**as of September 2006**



## **BUTTE HILL LIMESTONE STABILIZATION**

### **GENERAL**

Work described in this section shall consist of preparing the ground surface for limestone stabilization, hauling, placing, and spreading the limestone and fill on prepared areas in accordance with this Specification at the locations shown on the Drawings.

### **MATERIALS**

Limestone sources will be approved by EPA. Limestone may be from any approved source and shall have a calcium carbonate equivalent content of not less than 65%. All limestone must be <1 inch in diameter and 50% (weight basis) must pass a 60 mesh (<0.25 mm) sieve.

### **CONSTRUCTION REQUIREMENTS**

#### **pH Testing of Subgrade**

The responsible party (RP) Group shall test the subgrade soil pH of all areas to be revegetated. The frequency of testing shall not be less than one test per 40,000 square feet (approximately 200 x 200 foot grid). Limestone addition shall include areas to be revegetated where the subgrade soil has a pH of less than 5.5. Acid-base accounting (ABA) may be required by EPA under certain circumstances, such as the presence of acid-generating minerals, and the method used to determine ABA shall be as described in EPA-600/2-78-054. Documentation of this sampling effort, including a map showing sampling locations and sample results, shall be included in the final construction completion document(s) for the project.

#### **Installation of Limestone**

The surface of the subgrade in the area to be covered shall be brought to grade and finished smooth and uniform immediately prior to dumping and spreading the limestone. The limestone shall be placed prior to the placing of the cover soil. A minimum 350 tons/acre (approximately 2 inches) of limestone shall be placed on the low pH soil. Placement of the limestone layer on a site will be based on site-specific data and approved by EPA prior to placement of limestone.

Grades on the area to be covered shall be maintained in a true and even condition. Where grades have not been established, the areas shall be graded and sloped to drain. The surface shall be left smooth in an even and properly compacted condition to prevent, insofar as practical, the formation of low places or pockets where water will stand.



## **BUTTE HILL COVER SOIL**

### **GENERAL**

The work of this section covers all operations required for furnishing, excavating, hauling, stockpiling, spreading, and seedbed preparation of approved cover soil.

### **SUBMITTALS**

Cover soil submittals will be provided in the Design Report or under separate cover and approved by EPA prior to use. The following submittals shall be provided to EPA for each cover soil source:

- The intended cover soil source site location, including details on the area and depth to be excavated at the source site location.
- For each cover soil source, the RP Group shall be required to secure at least 3 soil samples from the source area. EPA will be notified in advance of the sampling effort and the approximate location and depth where samples will be collected.
- Each of the above 3 soil samples shall be analyzed by an approved laboratory for the following parameters: texture class and particle size; pH; saturation percent; electrical conductivity (EC) in mmhos/cm; organic matter percent; NO<sub>3</sub> - nitrogen; available phosphorus (P); and available potassium (K). The above parameters shall be analyzed using USDA classification and test methods as described in ASA/SSSA Monograph No. 9, Methods of Soil Analysis, Parts 1-2, most recent edition or as described in EPA approved Clark Fork River Superfund Site Investigations documents. Also, each of the above 3 soil samples shall be analyzed by an approved laboratory for the following soil metals parameters: arsenic, cadmium, copper, lead, and zinc. Cover soil placement shall not begin until test results of the soil samples are known.

### **MATERIALS**

Cover soil sources will be approved by EPA. Cover soil thickness shall be a minimum of 18 inches, unless otherwise approved by EPA in writing. Eighteen inches is considered the minimum thickness required for long-term vegetation success. Sufficient cover soil should be applied to account for settling, sloughing, and erosion. Cover soil material shall be reasonably free of any trash, rocks, lumps of soil, stumps, and brush. Rock content (i.e., particles >2.0 mm) must constitute <45% (by volume) of the cover soil and the maximum allowable rock size is 6 inches in diameter. To the extent possible, the cover soil source should be free of any noxious weeds.



Cover soil shall be a friable material and the <2.0 mm fraction characterized as loam, sandy loam, sandy clay loam, sandy clay, clay loam, silty clay, silty clay loam, silt loam, or silt in accordance with the USDA Soil Conservation Service textural classification provided below. Per approval of EPA, loamy sand may be acceptable from 6 to 18 inches in certain circumstances.

The soil pH shall be between 5.5 and 8.5. The soil SAR shall be <12. Soil saturation percent will be less than 85% and greater than 25%. The soil shall have an EC less than 4 mmhos/cm. NO<sub>3</sub>, P, and K will be used by EPA and the RP Group to verify fertilizer rates.

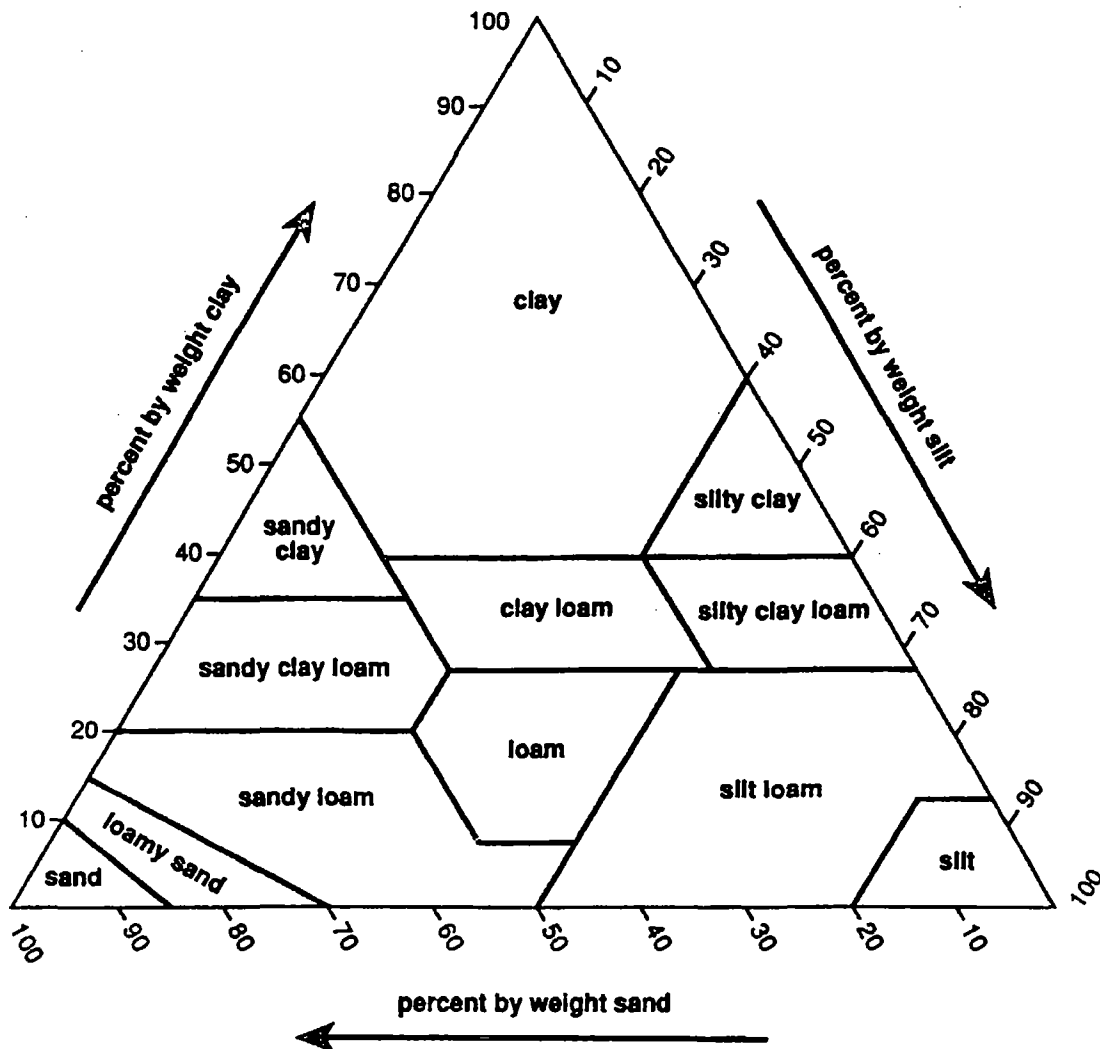


Figure 1. Graphic guide for textural classification of the less than 2 mm portion.  
(Source: USDA Soil Conservation Service)



The following chemical suitability criteria are general guidelines to be followed as screening standards:

As	<97 mg/kg
Cd	<4 mg/kg
Cu	<250 mg/kg
Pb	<100 mg/kg
Zn	<250 mg/kg

With the exception of zinc, these suitability criteria were established for parks, play areas, and residential yards in the Final Work Plan for Residential Areas, Butte Priority Soils Expedited Response Action prepared by ARCO dated May 1, 1995. These values were provided in a February 14, 1995, letter from Sara Weinstock (EPA) to Dave Sinkbeil (ARCO) providing final comments on the above work plan. The criterion for zinc was reduced to <250 mg/kg from <500 mg/kg to take into account potential phytotoxic effects noted at the higher level in the Final Baseline Ecological Risk Assessment, Anaconda Regional Water, Waste, and Soils Operable Unit, Anaconda Smelter NPL Site, Anaconda, Montana, prepared in October 1997 by CDM Federal Programs Corporation for EPA. The chemical suitability criteria listed above were established for the Butte Hill and may not be appropriate for use at other Clark Fork River Basin Superfund Sites.

It should be noted that some exceedances of the above criteria may still allow successful long-term vegetation. Therefore, if cover soil sampling shows a variance from the chemical suitability criteria, the RP Group will notify EPA and a plan to address the usability of that cover soil source will be discussed. EPA must approve in writing any cover soil sources which exceed the above suitability criteria.

### **CONSTRUCTION REQUIREMENTS**

Visual inspection of excavated cover soil shall be a continuous process to carefully observe and recognize changes in source material characteristics. Visual inspection, in conjunction with hand-texturing of the <2.0 mm fraction, will be used to determine the adequacy of the borrow material ahead of excavation, to assure that current material meets textural criteria, and to identify areas to move to if material begins to fall out of specification. Each inspection shall record the location, test number for that day, date, time, estimated rock content percentage, and soil texture (<2.0 mm fraction). The frequency of inspection is dependent on the variability of the cover soil source material, but must be performed and recorded at least once daily during periods of source material excavation and transport. It is desirable to have the same person perform the inspections for the duration of excavation at a particular source area. In addition to the above visual inspections, textural analysis by laboratory hydrometer testing may be requested by EPA at a rate not to exceed one test for every 5,000 cubic yards of cover soil material excavated. These tests will be used for comparison and guidance for field testing and field observations. Copies of all inspection records and laboratory analyses shall be provided to EPA for review. Summaries of inspection records and analyses shall be included in the final construction completion documents for the project.



For revegetation purposes, slopes must not exceed a maximum of 3:1 (3 horizontal to 1 vertical) unless previously agreed to by EPA and the RP Group because of site specific requirements. Cover soil shall not be placed until the areas to be covered have been properly prepared, the limestone layer appropriately applied (if required), all construction work in the area has been completed and approved by the RP Group, and EPA notified that all subgrade preparations have been completed.

After the cover soil has been spread, large clods, hard lumps, rocks, and large roots over 6 inches in diameter; litter; or other foreign material (exposed iron, timbers, etc.) shall be raked up, removed from the cover soil and disposed of properly. Further preparation of the cover soil for seeding is provided in the specifications for Seeding and Fertilizing.

The RP Group shall grade the source area borrow site(s) to existing contours at slopes not to exceed 3:1 (unless previously agreed to by EPA and the RP Group because of site specific requirements) and to provide positive drainage. The RP Group shall replace stockpiled topsoil to the borrow area. The borrow area shall be prepared for seeding, mulching, and fertilizing as are other areas receiving cover soil.



## **BUTTE HILL ORGANIC AMENDMENT APPLICATION**

### **GENERAL**

Organic amendment application shall consist of furnishing, applying, and incorporating soil amendments, such as manure and compost, at locations and rates designated on the Drawings.

### **SUBMITTALS**

Organic amendment submittals will be provided in the Design Report or under separate cover and approved by EPA prior to use. The following submittals shall be provided to EPA for each organic amendment source:

- Location of Supplier;
- For each supplier, at least three organic amendment analyses, including gravimetric water content, rock and other fragment content, and organic matter content, as described further under Materials; and
- Proposed organic amendment application and incorporation methods and equipment.

### **MATERIALS**

Analyses for organic amendments (such as manure, compost, etc.) shall include the gravimetric water content (% dry weight), the percentage of rock and/or other fragments >2.0 mm fraction (% dry weight), and organic matter content of the <2.0 mm fraction (% dry weight). The organic matter content of the <2.0 mm fraction shall be determined in the laboratory using Walkley-Black procedure, ASA, Meth. Soil Anal., 1986, Method 29-3.5.2.

If manure is used as the organic amendment source, cattle manure shall be the preferred manure type. Straw bedding material mixed into the manure is acceptable, but it shall not constitute more than 20% of the dry weight.

### **Application Rate**

The field application rate shall be calculated using 3% organic amendment on a dry weight basis in the upper 6 inches of cover soil. Upon approval or direction from EPA, the 3% application rate may be modified to account for site-specific conditions. Analyses for organic amendments shall be submitted for each Supplier on a regular basis to determine if adjustments to the field application rates are necessary. The water and rock and/or other fragment content shall be deducted in calculating the field organic amendment application rate. Documentation of the organic amendment application, including application rate calculations, shall be included in the final construction completion documents(s) for the project.



## **CONSTRUCTION REQUIREMENTS**

### **Stockpiling Organic Amendment**

Prior to stockpiling organic amendment on site, the Contractor shall develop an acceptable stockpiling plan for the RP Group review and approval. The plan shall include the location of the stockpile and adequate measures to prevent contamination of underlying and adjacent soils and prevent air or water pollution.

### **Site Grading**

Prior to placement of the organic amendment, all areas shall be graded as necessary to approximately restore the design contours of the ground or to produce a contour that will blend with contours of adjacent areas. This shall include grading erosion channels in revegetated areas that are to receive organic amendment.

### **Organic Amendment Application**

Organic Amendment shall be applied with agricultural manure spreaders or other approved application equipment that enables spreading a uniformly regulated amount of material.

For a specified application rate, the Contractor shall apply the organic amendment in a uniform manner across the landscape. Localized organic amendment application thicker than 6 inches is unacceptable.

Contractor shall calibrate the organic amendment spreader prior to each use of the equipment unless site conditions have not changed and equipment settings have not been altered since previous calibration. Calibration records shall be furnished to the RP Group. Upon request, copies of equipment calibration shall be provided to EPA for review. All calibration records shall be included in the final construction completion document(s) for the project.

Under no circumstances shall the Contractor apply the organic amendment during wind conditions strong enough to displace material onto adjacent sites.

### **Organic Amendment Incorporation**

Following organic amendment application, the soil shall be ripped to a 6-inch depth at 12-inch centers. The soil shall then be tilled to a depth of 6 inches with a disc, rototiller, moldboard plow, or chisel plow. An agricultural disc with a disc diameter of approximately 20 inches having cone-shaped discs at a spacing width of 6-8 inches is recommended. Multiple tilling equipment passes may be required to achieve adequate incorporation. Adequate incorporation will be a complete and uniform mixing of the manure and soil to a depth of 6 inches. All tillage procedures shall be completed as soon as practicable after amendment application.



## **BUTTE HILL SEEDING AND FERTILIZING**

### **GENERAL**

Revegetation work described in this section includes fertilization, seeding, and mulching on all project designated and disturbed areas upon completion of construction work. These areas include finished embankment slopes, borrow areas, areas to be revegetated, and disturbed areas.

### **MATERIALS**

#### **Seed**

Seed mixes used must be in compliance with all applicable laws and regulations, including Section 80-5-123, MCA, (Label requirements for agricultural, vegetable, flower and indigenous seeds), 80-5-134, MCA, (Prohibitions), and other state and county restrictions and requirements relating to seed mixes and labeling. Weed species prohibited in the mix should include those species prohibited in the downstream Montana counties as well as those prohibited in the county of planting.

Hand collected native species and some of the special wetland species collected cannot meet the following requirements. All other seed shall comply with, and be labeled in accordance with Montana seed law, Title 80, Chapter 5, Montana Code Annotated (MCA). Indigenous seeds, as defined in Section 80-5-120(14), MCA, in amounts of one pound or more, whether in packages or bulk, must be labeled with the following information:

1. Name and mailing address of the seed labeler;
2. Lot number or other lot identification mark;
3. The Statement "Labeled only for reclamation purposes";
4. The common name, genus, species, and subspecies, when applicable, including the name of each kind of seed present in excess of 5 percent. When two or more kinds of seed are named on the label, the label shall specify the percentage of each. When only one kind of seed is present in excess of 5 percent and no variety name or type designation is shown, the percentage must apply to seed of the kind named. If the name of the variety is given, the name may be associated with the name of the kind. The percentage in this case may be shown as "pure seed" and must apply only to the seed of the variety named;
5. State or county of origin;
6. The percentage of viable seed, together with the date of the test. When labeling mixtures, the percentage viability of each kind shall be stated. The method used to determine viability shall be stated on the label;
7. The percentage by weight of pure seed;



8. The percentage by weight of all seeds;
9. The percentage by weight of inert matter;
10. The percentage by weight of other crop seeds; and
11. The name and rate of occurrence per pound of each kind of restricted weed seed present;

As required by ARM 4.12.3010, seed shall contain no "Prohibited" noxious weed seed. The seed shall contain no "Restricted" weed seed in excess of the maximum numbers per pound, as specified by ARM 4.12.3011, or as specified by the appropriate BSB County Weed Board, whichever is more stringent.

As defined by MCA 80-5-120(14), indigenous seeds include the seeds of those plants that are naturally adapted to an area where the intended use is for revegetation of disturbed sites. These species include grasses, forbs, shrubs, and legumes.

The Contractor must supply the RP Group with all seed bag tags and certification from the supplier stating that the seed complies with the Federal Seed Act and the Montana Seed Laws, Title 80, Chapter 5, MCA and applicable regulations. Upon request, copies of said tags shall be submitted to EPA for review. Copies of seed bag tags and certification shall be included in the final construction completion documentation the project.

When legumes are seeded as the predominant mixture, the seed supplier shall include inoculants (rhizobia) and provide documentation as specified in the Seed Certification. Seed Certifications shall be submitted to the RP Group prior to any seeding. The Contractor shall also submit a copy of the bill or other documentation from the seed supplier showing actual bulk weights of the individual seed types combined in the mix and verification of legume inoculation. The required certifications and documentation shall be provided to the RP Group at least three days prior to the seeding.

### **Fertilizer**

Fertilizer shall be delivered in standard-size bags of the manufacturer showing weight analysis and manufacturer's name, or in bulk quantities accompanied with written certifications from the manufacturer stating that the fertilizer supplied complies with applicable Specifications.

Fertilizer shall be soluble commercial carrier of available plant food element or combination thereof. The fertilizer to be used on the project shall supply the quantities of available chemical elements stipulated below. The fertilizer shall be of uniform composition and in good condition for application by suitable equipment. It shall be labeled with the manufacturer's guaranteed analysis, as governed by applicable fertilizer laws. Any fertilizer that becomes contaminated or damaged, making it unsuitable for use, shall not be accepted. All required fertilizer certificates shall be provided to the RP Group a minimum of three days prior to fertilizing. The certification shall include the guaranteed analysis of the fertilizers stated in the terms of the percentages of nitrogen, and available phosphorous, potash, and boron, in that order.



## **Mulch**

Vegetative mulch shall be either grass hay or straw. Grass hay material shall be composed primarily of perennial grasses. The grass hay mulch shall contain greater than 70 percent grass by weight and shall not contain more than 10 percent alfalfa, crested wheatgrass or yellow sweet clover. Grass hay shall be relatively free of noxious weeds and other undesirable species.

Straw mulch material shall be clean grain straw, shall be relatively free of noxious weeds and other undesirable species, and shall not contain greater than 5 percent cereal seed by weight, i.e., seed heads. Wheat straw will be used whenever possible. Harvesting will be performed with modern combines, which leave less grain in the straw. Written approval of straw and hay sources from the supervisor of the BSB County weed board shall be obtained.

Chopped or ground material is not acceptable. The mulch material is not acceptable if it is damaged by rotting, molding, etc. to seriously limit its use for mulch. It shall be relatively free of stones, dirt, roots, stumps, or other foreign material.

Application rates shall be 3,000 lbs/acre on flat non-critical erosion and potential dust generating areas and 4,000 lbs/acre on all critical runoff and potential dust generating areas. Exact application rates will be adjusted in the field to accommodate differences in mulch material and seedbed conditions.

## **CONSTRUCTION REQUIREMENTS**

### **Seedbed Preparation**

Prior to executing the seeding, fertilizing and mulching work items, the seed bed at all sites shall be prepared so these items can most efficiently be completed, with the areas resulting in reasonable conformity to specified line and grade. The fertilizing, seeding, and mulching work items shall be executed only after the seedbed condition has been approved by the RP Group. The cover soil shall be prepared as described in the Cover Soil specifications.

The seedbed surface must be in a condition that does not preclude growth at the time of application of seed. Conditions that may preclude growth include, but are not limited to: large clumps, clods, and impervious crusts of dirt; areas too tightly compacted to allow seed growth; and areas of loose soils which could possibly become too compacted during the seed applications to allow growth. The decisions on the conditions of the seedbed shall be made by the RP Group. If the RP Group determines the seedbed is inadequate for seeding, the Contractor shall treat the inadequate areas, as directed by the RP Group, to attain as nearly as practicable the adequate condition at no additional cost to the RP Group.

Excessively tight or compacted soils shall be loosened to the minimum depth of 6 inches. Disking, chiseling, or tilling of the soils shall be done at right angles to the natural flow of water on the slopes, unless otherwise directed or approved by the RP Group. Compaction of the soil, when required, shall be performed by equipment that shall produce a uniform rough-textured surface ready for seeding and mulching.



Existing structures and facilities shall be adequately protected and any damage done by the Contractor shall be repaired or adjusted to the satisfaction of the RP Group.

### **Seed Application**

#### **General**

Slopes and areas finished during the period of October 15 through June 15 may be permanently seeded within this time period. The Contractor must obtain the RP Group permission to commence seeding operations. Slopes and areas finished during the period June 16 through October 14 shall receive an annual cover crop from the strawmulch seed to protect the in-place cover soils during this period. The control of noxious weeds and other undesirable species will also be addressed during this period. The perennial seed mix shall then be applied to the areas after October 15. EPA shall be notified prior to commencement of seeding activities.

Specifications of each type of seed mix are outlined below. The seeding of steep slopes, narrow medians, or small areas that are impractical to seed by drill may be performed by using the hydraulic seeding methods, when approved by the RP Group. The hydraulic seeding methods shall be used when the seedbed surface is too wet or swampy to permit seeding by drill. Hydraulic seeding methods shall not be used during adverse weather, as determined by the RP Group.

The applied seed, regardless of the method of application, shall not be covered by a soil thickness greater than 1 inch in depth.

#### **Seed Application Equipment**

##### *Drill Seeding*

Seeding equipment used for applying grass/forb seed must be designed, modified or equipped to regulate the application rate and planting depth of the seed mixture. Seed must be uniformly distributed in the drill hopper during the drilling operation. Acceptable drills are: custom seeders, furrow drills, disc drills or other drills approved by the RP Group. All seeding equipment shall be operated perpendicular to the slope. Contractor shall calibrate the drill seeder prior to each use of the equipment unless site conditions have not changed and equipment settings have not been altered since previous calibration. Calibration records shall be furnished to the RP Group. Upon request, copies of equipment calibration shall be provided to EPA for review. A summary of all calibration records shall be included in the final construction completion document(s) for the project.

Planting depth shall be regulated by depth bands or coulters. The drill box shall be partitioned by dividers no more than 24 inches apart, in order to provide for more even distribution on sloping areas. The rows or planted seed shall be a maximum of 8 inches apart. Drilling depth shall be from 1/4 to 1 inch.



*Broadcast Seeding*

Seeding by hand or mechanical broadcasting shall be permitted on areas inaccessible to drills or impractical to seed by other prescribed methods. The broadcast seeding rate shall not be less than twice the drill seeding rate. Following the seeding, the soil shall be hand-raked to cover the seed. Broadcast seeding requires the prior approval of the RP Group.

*Hydraulic Seeding*

The Contractor must provide one pound of wood fiber mulch per each 3 gallons water in the hydraulic seeder as a cushion against seed damage. The mulch used as a cushion may be part of the total required mulch with the remainder applied after the seed is in place. The Contractor may be required to use extension hoses to reach the extremities of slopes.

When using vegetative mulch, the Contractor may mix the seed with the fertilizer if his hydraulic seed equipment is capable of uniformly mixing water, fertilizer, and seed, in that order, and power blowing or spraying the mixture uniformly over the seedbed. After blending, the slurry shall be applied to the seedbed within 45 minutes after the seed has been added to the water-fertilizer mixture. If the slurry cannot be applied within the specified time, it shall be fortified, at no cost to the RP Group, with the correct ratio of seed to the remaining slurry and a new 45-minute time frame established for applying the fortified mixture. At no time shall seed and fertilizer remain in a slurry for more than 45 minutes.

Seed Application Areas/Rates - The revegetation mixes include:

**Butte Hill 1997 Primary Seed Mixture  
Revegetation Mix**

<b>Seed Mixture</b>	<b>Rate, #PLS/Acre</b>
Slender Wheatgrass	3.0
Thickspike Wheatgrass	2.0
Sheep Fescue	2.0
Crested Wheatgrass	1.0
Ladak Alfalfa	1.0
Red Clover	2.0
Canada Bluegrass	1.0
Birdsfoot Trefoil	1.0
<b>Total</b>	<b>13.0</b>



**Butte Hill****Alternate Seed Mixture No. 1 - Gentle Sloped Areas (Less than 10:1) Revegetation Mix**

<b>Seed Mixture</b>	<b>Rate, #PLS/Acre</b>	<b>Planting</b>
Bozoisky Russian Wildrye	5.0	Initial seeding, drill seeded on 15-18 inch centers.
Ladak Alfalfa	2.0	Interseeded during following years as determined by vegetation monitoring.
<b>Total</b>	<b>7.0</b>	

**Butte Hill****Alternate Seed Mixture No. 2 B Grass-lined Ditches**

<b>Seed Mixture</b>	<b>Rate, #PLS/Acre</b>
Smooth Brome	5.0
Birdsfoot Trefoil	1.0
Red Clover	0.5

Pure live seed application rates shall be as specified in the tables.

The 1997 primary seed mixture was proposed by BSB County and is based upon their monitoring results for successful revegetation within the Butte area and has been reviewed and approved by BSB County, EPA and the State for use in upland areas of the Butte Priority Soils Operable Unit. The Alternate Seed Mixture No. 1 will only be used in areas with slopes of <10:1 that are particularly susceptible to weed infestation. Additional optimal conditions for use of the alternative seed mix include locations with high moisture holding capacity and shelter from strong wind conditions. The Alternate Seed Mixture No. 2 has been proposed by BSB County and is an option for hand seeding grass-lined ditches and detention basins.

Calculations of pure "live seed" may be made on the basis of either a germination test or a tetrazolium test in addition to the purity analysis. Seed shall be applied on a pure "live seed" basis. The quantity of pure "live seed" in a 100-lb. container shall be determined by the formula: 100 multiplied by germination percentage, and this product multiplied by the purity percentage. For example, if the seed is 85 percent pure and test 90 percent germination, then a 100-lb. container would contain 76.5 pounds of pure "live seed".



### **Fertilizer Application**

If surface soil nutrient availability data are not available, fertilizer will be applied at a rate to achieve soil concentrations of 60 lbs. of nitrogen (N) per acre, 80 lbs. of  $P_2O_5$  per acre, and 150 lbs. of  $K_2O$  per acre. Mechanical or hydraulic methods of application are allowed, providing a uniform application at the specified rate is accomplished. The application method is subject to approval by the RP Group. When scheduling and soil conditions permit, the fertilizer shall be incorporated into the soil by disking, raking, or shallow plowing to the full depth of the topsoil or to a maximum depth of six inches, whichever is less.

Fertilizer shall be applied to the prepared seedbed prior to seeding or mulching and shall be blended with the top layer of soil or concurrently with the seed (as “no-till” drills allow). Upon EPA approval, fertilizer may be applied subsequent to seeding and mulching. Re-fertilization following seedling establishment will not require incorporation. In no instance shall subsoil be incorporated into the seedbed as a result of the fertilization operation.

### **Mulch Application**

Mulch is usually applied during the summer and early fall and drill seeded after October 15<sup>th</sup>. The mulch shall be applied in a uniform manner by a mulch spreader at rates varying from 2,000 to 4,000 lbs. per acre. The actual rate utilized shall depend upon site conditions (i.e., slope, erosion potential, etc.) and shall be approved by the RP Group and EPA prior to application. The mulch spreader shall be designed specifically for this type of work. The vegetative material shall be fed in the mechanical spreader at an even, uniform rate.

The mulch shall be anchored into the seedbed by using a mulch tiller (crimper). Straw or hay shall be clean grain straw and shall be pliable.

Mulch tillers shall have round, flat, notched blades of these approximate dimensions: 0.25-inch thick by 18 inches in diameter and spaced 8 inches apart. The tiller shall have sufficient weight to force the vegetative mulch a minimum of 3 inches into the soil and shall be equipped with disc scrapers. Mulch tilling shall be done on all slopes capable of being safely traversed by a tracked vehicle. All mulch tilling shall be done perpendicular of the flow-line of the slope.

Mulch, where required, will be applied to seeded areas as close as possible to the completion of seeding operations for the area. Mulch shall not be applied in the presence of free surface water, but may be applied upon damp ground.

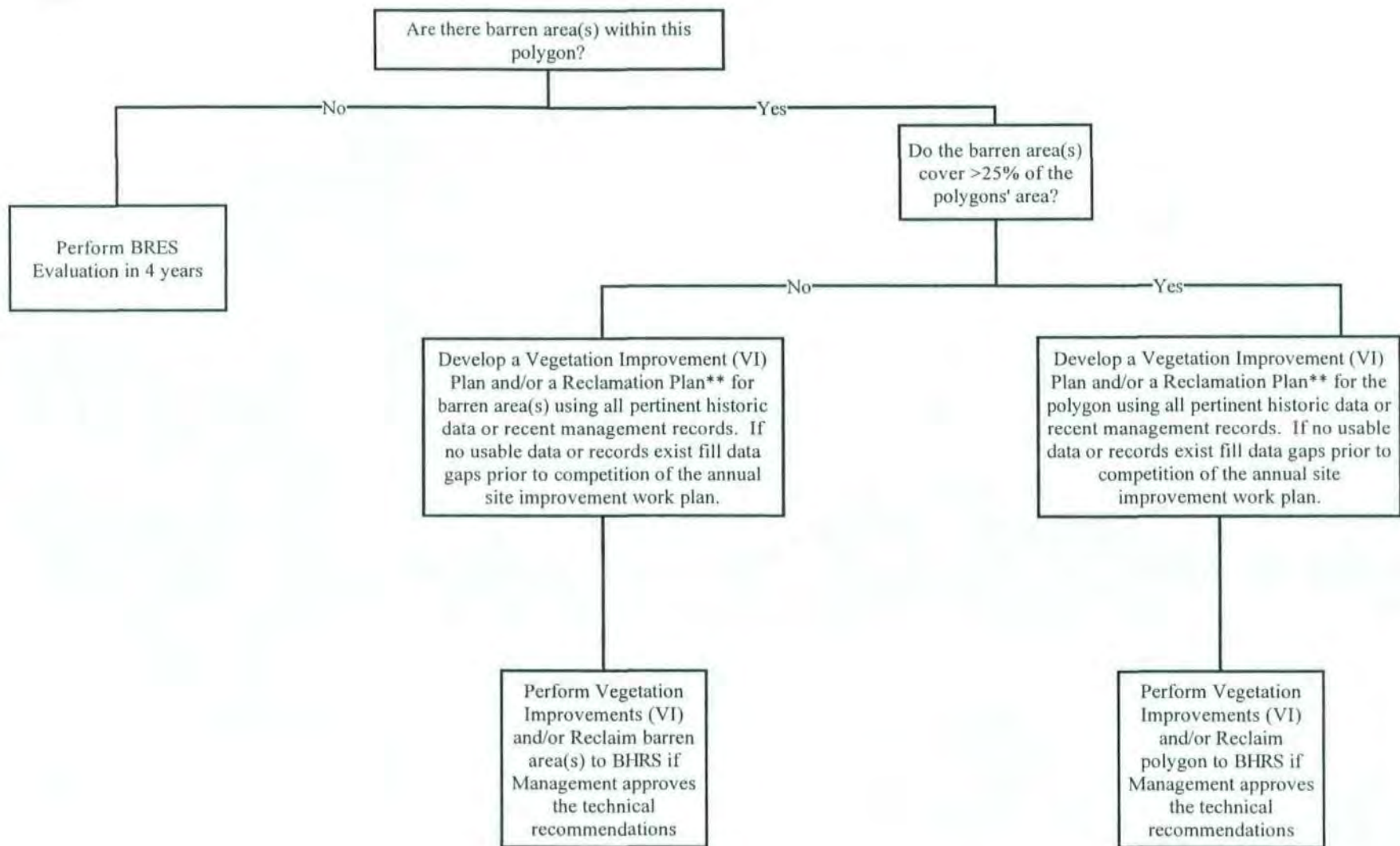
Mulch shall not be applied to areas having a substantial vegetative growth, such as grasses, weeds, and grains. Areas not to be mulched shall be determined by the RP Group. Mulching shall not be done during adverse weather conditions or when wind prevents uniform distribution. Application shall be in a manner to not seriously disturb the seedbed surface.



## BRES Appendix C

### BRES Decision Logic

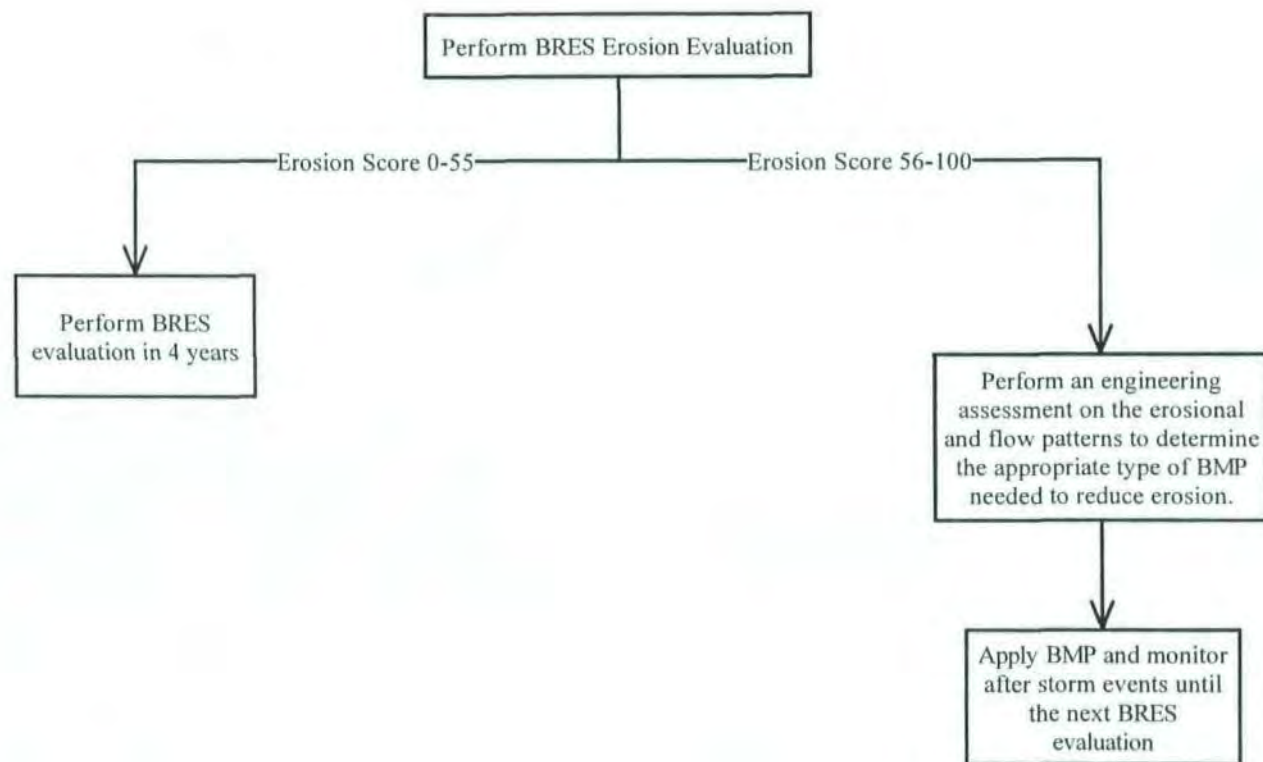




\*\*Reclamation will occur only within a polygon that has had Vegetation Improvements (VI) fail and is not meeting the BHRS.

BRES Barren Area Evaluation  
 BHRS- Butte Hill Revegetation Specification  
 BRES- Butte Reclamation Evaluation System  
 SAP- Sampling and Analysis Plan

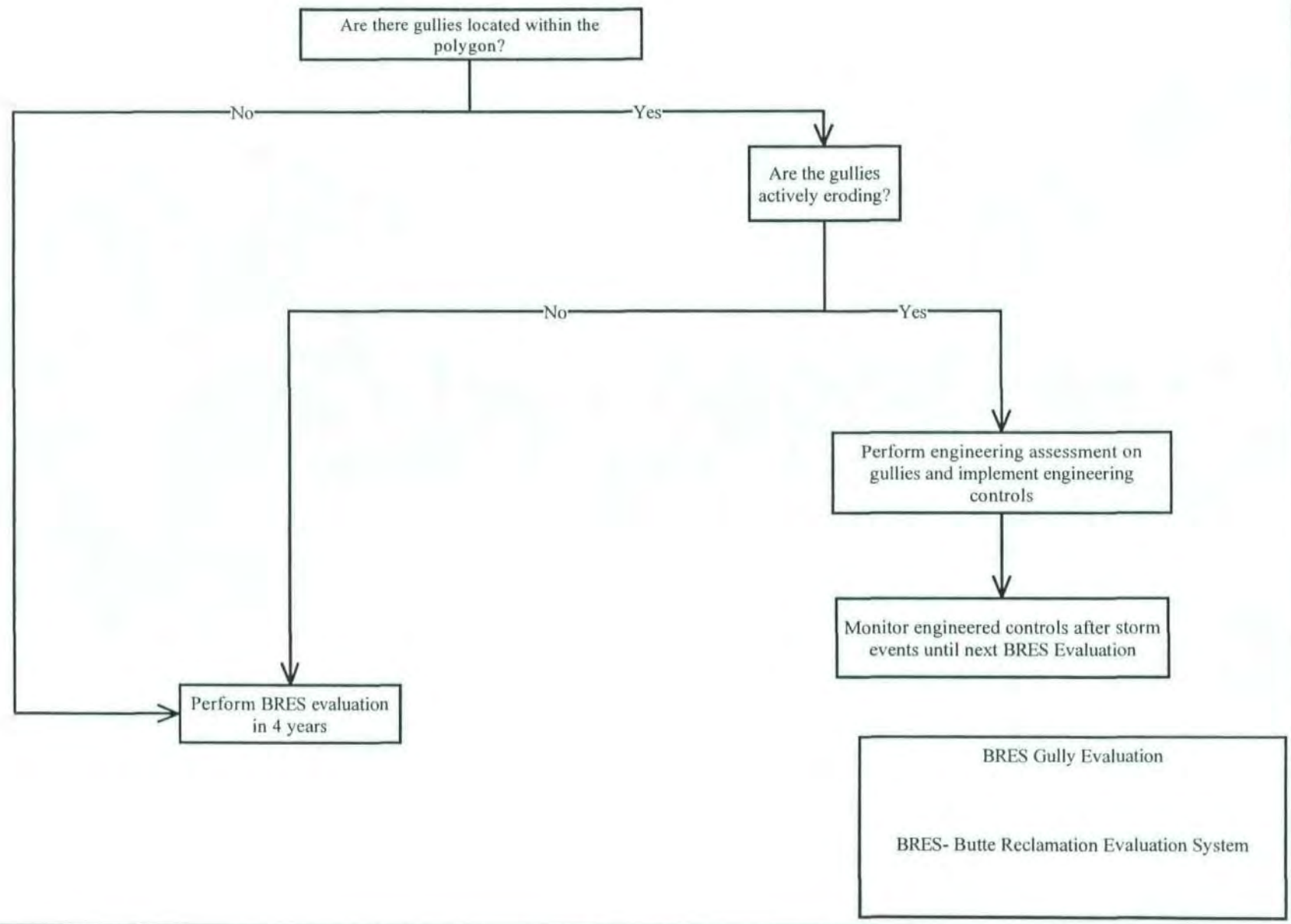




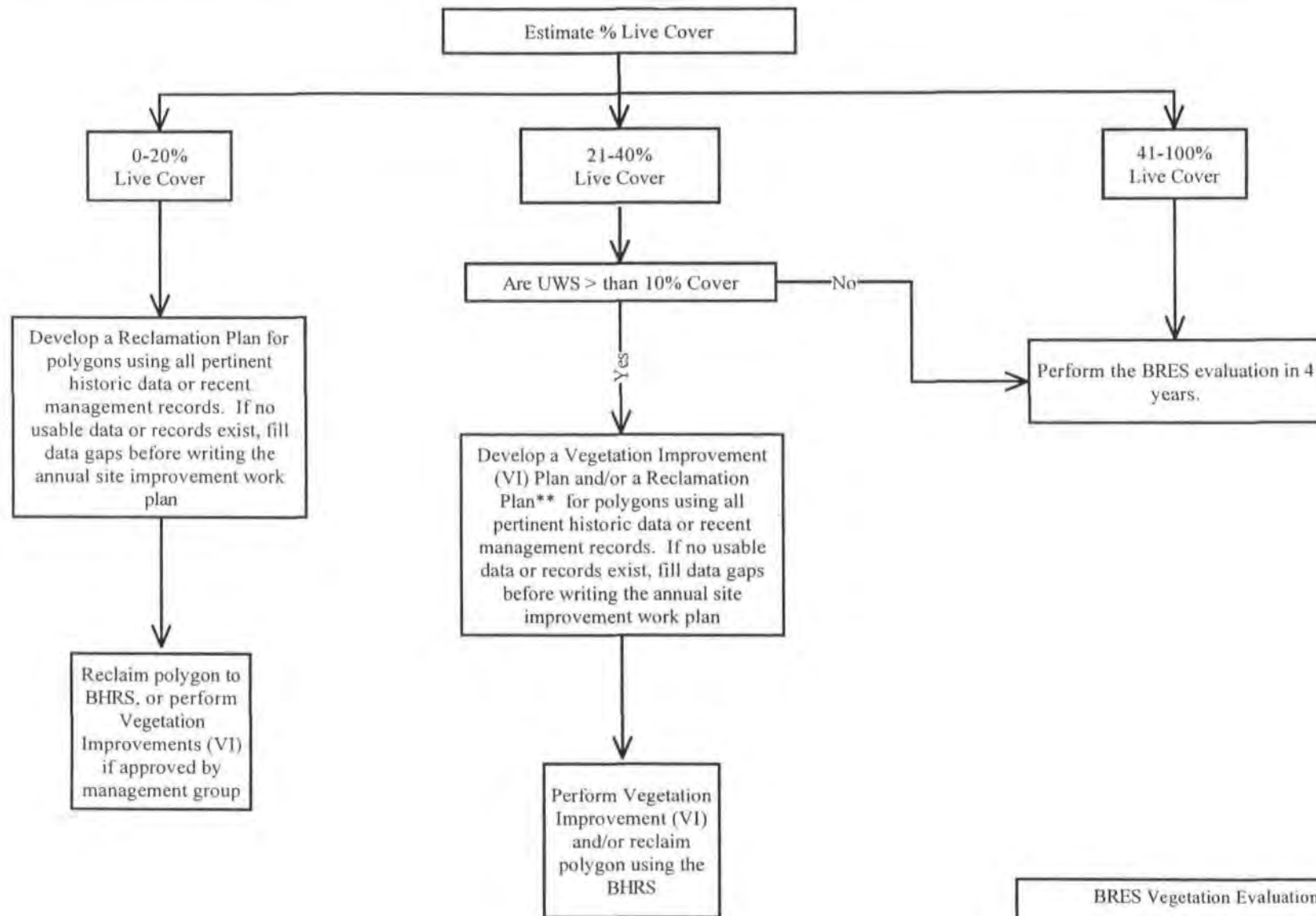
BRES Erosion Evaluation

BMP- Best Management Practice  
BRES- Butte Reclamation Evaluation System





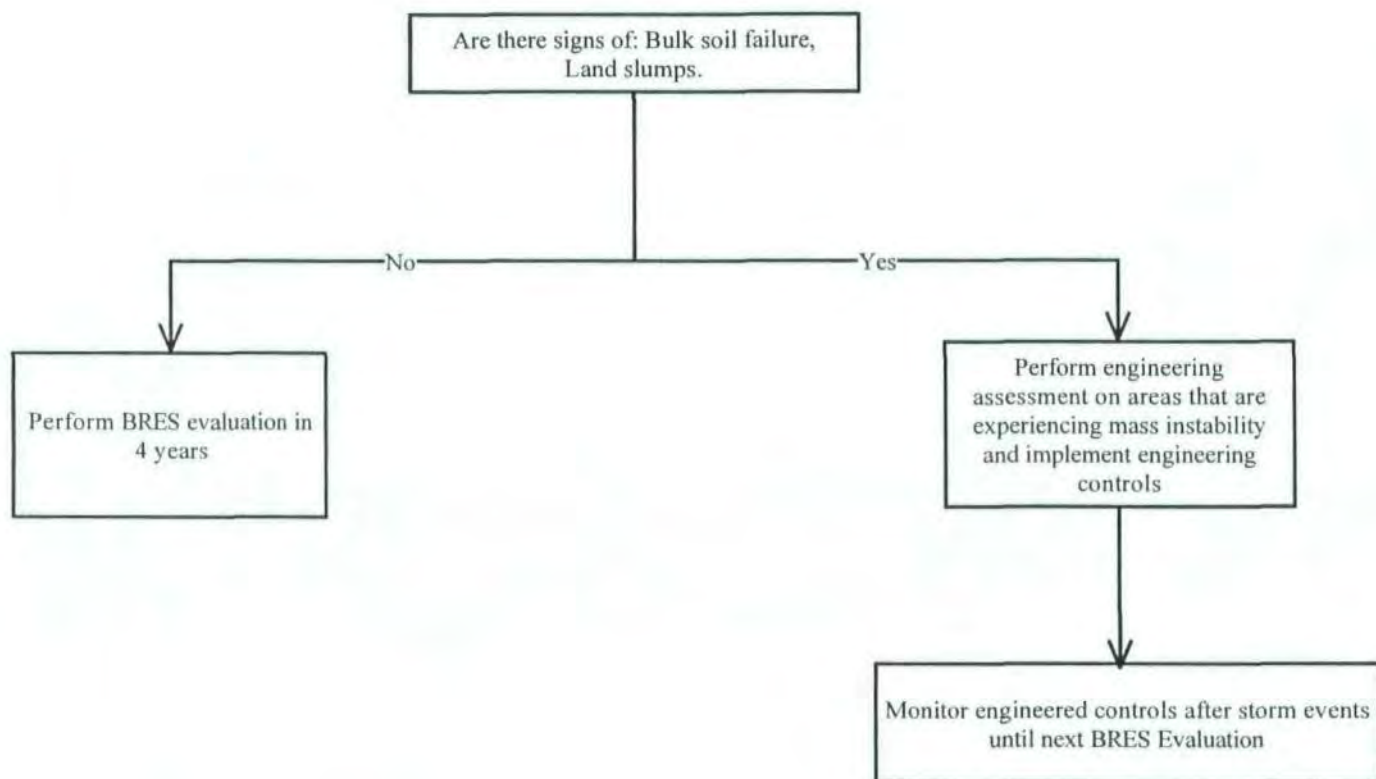




\*\*Reclamation will occur only within a polygon that has had Vegetation Improvements (VI) fails and is not meeting the BHRS.

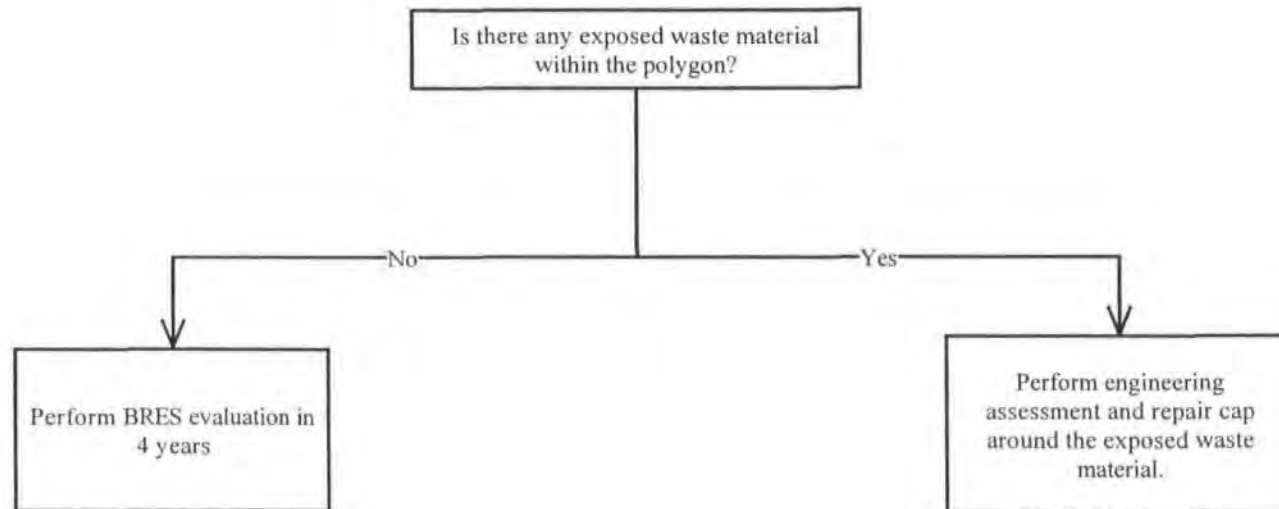
**BRES Vegetation Evaluation**  
 BRES- Butte Reclamation Evaluation System  
 UWS-Undesirable Weedy Species  
 BHRS- Butte Hill Revegetation Specification  
 VI- Vegetation Improvements





BRES Mass Instability Evaluation  
BRES- Butte Reclamation Evaluation System





BRES Exposed Waste Material  
Evaluation



BRES Appendix D

BRES Field Form



**BRES FIELD FORM**

Site Name: \_\_\_\_\_ Date: \_\_\_\_\_

Team Members (Circle your name): \_\_\_\_\_

Number of Polygons: \_\_\_\_\_ Slope: \_\_\_\_\_ Aspect: \_\_\_\_\_ Area Description: \_\_\_\_\_

Polygon Evaluation	1	2	3
Vegetation (% live)			
Erosion (BLM score)			
% live weedy species			

Vegetation: % of ground covered by:	POLYGON			Erosion (BLM Form)	POLYGON			Other BRES Trigger Items	
	1	2	3		1	2	3	*Identify trigger areas (using # ) on air photo*	
Live (desirable) species				Surface Litter				<b>3. Site Edges:</b> Are polygon edges (outer edges of site only) significantly different than remainder of the polygon? Y____ N____ (check applicable items) <input type="checkbox"/> lime rock barrier <input type="checkbox"/> depositional area <input type="checkbox"/> more weeds <input type="checkbox"/> steeper slope <input type="checkbox"/> increased erosion <input type="checkbox"/> less vegetation <input type="checkbox"/> gullies <input type="checkbox"/> other _____ Estimate width of affected edge _____	
*Live (undesirable weedy) species				Surface Rock Movement					
*Noxious weeds				Pedestalling					
<b>TOTAL % LIVE</b>				Flow Patterns					
Litter				Rills					
Rocks > 2"				Gullies				<b>4. Exposed Waste Material?</b> Y____ N____ • Estimated pH _____ • Approximate area _____ • Number of areas with exposed waste _____	
*Up to 5% of undesirable species and 0% of noxious weeds may count toward live cover.				Soil Movement					
<b>1. Percent live:</b> please check appropriate category: 1 <input type="checkbox"/> 0-20 <input type="checkbox"/> 21-39 <input type="checkbox"/> 40-100 2 <input type="checkbox"/> 0-20 <input type="checkbox"/> 21-39 <input type="checkbox"/> 40-100 3 <input type="checkbox"/> 0-20 <input type="checkbox"/> 21-39 <input type="checkbox"/> 40-100				<b>2. Total BLM score</b> 1____, 2____, 3____. Please check appropriate category. 1 <input type="checkbox"/> 0-55 <input type="checkbox"/> 56-100 2 <input type="checkbox"/> 0-55 <input type="checkbox"/> 56-100 3 <input type="checkbox"/> 0-55 <input type="checkbox"/> 56-100				<b>5. Is there evidence of:</b> Y____ N____ <input type="checkbox"/> bulk soil failure <input type="checkbox"/> land slumps <input type="checkbox"/> subsidence	
<b>Species Present:</b> Dominant    Frequent    Infreq. Sheep fescue Crested wheatgrass Slender wheatgrass Yellow sweetclover Alfalfa Other: _____ _____ _____ _____ Use polygon number in boxes				<b>Weeds Present:</b> Dominant    Frequent    Infreq. Spotted knapweed Dalmation toadflax Cheatgrass Baby's breath Kochia Thistle Other: _____ _____ _____ _____ Use polygon number in boxes				<b>6. Barren Areas:</b> Y____ N____ • At Least 75 ft <sup>2</sup> • Not a rock outcrop • Less than 10 % total cover (live & litter) Number of barren areas _____ Do barren areas cover over 25% of polygon? Y____ N____ Polygon barren area(s) located in (circle)    1    2    3 <b>7. Gullies</b> (over 6" in depth): Y____ N____ Are any gullies actively eroding? Y____ N____ Number of gullies _____	



Comments.

**Additional Vegetation:**

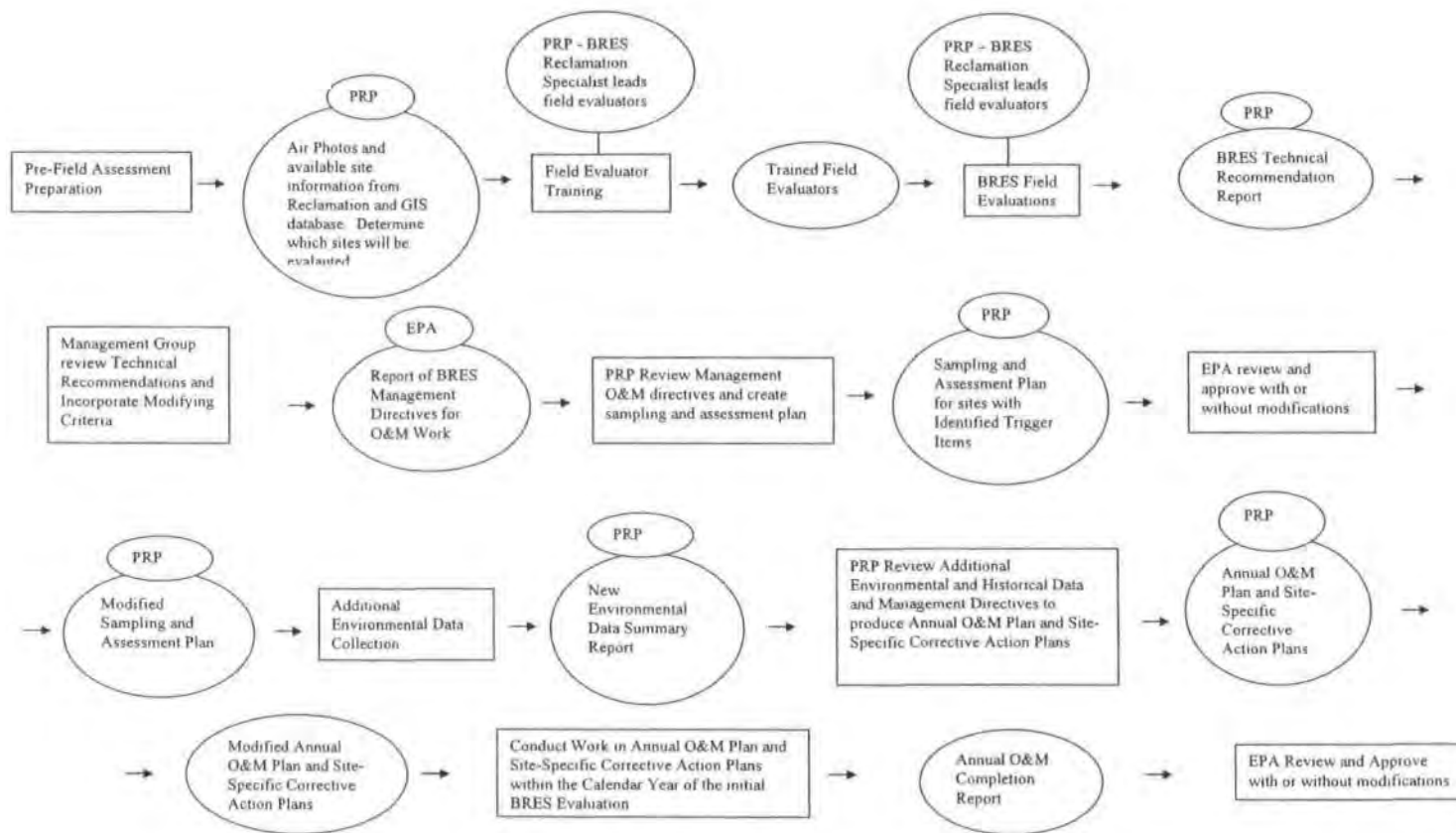
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## BRES Appendix E

### Annual BRES Process Flow Chart





**Annual BRES Process Flowchart**



## BRES Appendix F

### BRES Engineered Cap Integrity Field Form



**Butte Reclamation Evaluation System (BRES)**  
**Raw Data Field Form for Engineered Caps**

Date \_\_\_\_\_ Site Name/Number \_\_\_\_\_  
 Field Team Members \_\_\_\_\_  
 Area Description \_\_\_\_\_

**Rock Cap**

Type of rock (limestone, pit run gravel, etc.) \_\_\_\_\_ Design thickness \_\_\_\_\_  
 Surface staining: None \_\_\_\_\_ Moderate \_\_\_\_\_ Excessive \_\_\_\_\_ Describe stain pattern/color \_\_\_\_\_

Displaced rock: None \_\_\_\_\_ Moderate \_\_\_\_\_ Excessive \_\_\_\_\_ Pattern of displacement: Localized \_\_\_\_\_ Universal \_\_\_\_\_  
 Describe movement (storm water rills, steep slope instability, vehicular, etc.) \_\_\_\_\_

Does rock cap have a geotextile liner? Yes \_\_\_\_\_ No \_\_\_\_\_ If yes, describe condition of liner (good, exposed, torn, poorly anchored, etc.) \_\_\_\_\_

Exposed subgrade materials? Yes \_\_\_\_\_ No \_\_\_\_\_ Describe exposed subgrade if noted (area, localized, dispersed, etc.) \_\_\_\_\_

General comments regarding rock cap: \_\_\_\_\_

**Concrete or Shotcrete Cap**

Did design specify for sulfate resistant concrete? Yes \_\_\_\_\_ No \_\_\_\_\_ Unknown \_\_\_\_\_ Design thickness \_\_\_\_\_

Type of reinforcing (fiber, re-bar, welded wire fabric.) \_\_\_\_\_ Control joints? Yes \_\_\_\_\_ No \_\_\_\_\_

Surface staining: None \_\_\_\_\_ Moderate \_\_\_\_\_ Excessive \_\_\_\_\_ Describe stain pattern/color \_\_\_\_\_

Surface cracking: None \_\_\_\_\_ Moderate \_\_\_\_\_ Excessive \_\_\_\_\_ Describe the approximate frequency, length, and average thickness of the cracks if noted. \_\_\_\_\_

Surface spalling: None \_\_\_\_\_ Moderate \_\_\_\_\_ Excessive \_\_\_\_\_ Describe the spalling pattern if noted. \_\_\_\_\_

Exposed subgrade materials? Yes \_\_\_\_\_ No \_\_\_\_\_ Describe exposed subgrade if noted (area, localized, dispersed, etc.) \_\_\_\_\_

Evidence of undercutting at edges of cap? None \_\_\_\_\_ Moderate \_\_\_\_\_ Excessive \_\_\_\_\_ Describe undercutting of subgrade soil at edges of cap if noted \_\_\_\_\_

General comments regarding concrete/shotcrete cap: \_\_\_\_\_

**Asphalt Cap**

Design Thickness \_\_\_\_\_ Is there a layer of base course under asphalt? Yes \_\_\_\_\_ No \_\_\_\_\_ Base course thickness \_\_\_\_\_

Surface cracking: None \_\_\_\_\_ Moderate \_\_\_\_\_ Excessive \_\_\_\_\_ Describe the frequency, length, and average thickness of the cracks if noted. \_\_\_\_\_

Holes in asphalt? Yes \_\_\_\_\_ No \_\_\_\_\_ Describe number, size, shape of holes in asphalt if noted. \_\_\_\_\_

Exposed subgrade materials? Yes \_\_\_\_\_ No \_\_\_\_\_ Describe exposed subgrade if noted (area, localized, dispersed, etc.) \_\_\_\_\_

Evidence of undercutting at edges of cap? None \_\_\_\_\_ Moderate \_\_\_\_\_ Excessive \_\_\_\_\_ Describe undercutting of subgrade soil at edges of cap if noted \_\_\_\_\_

General comments regarding asphalt cap: \_\_\_\_\_



## BRES Appendix G

### BPSOU Plant Species Classes



## BSPOU Plant Species Classes

Species Name	Life form Code	Life form Class	Common Name	Desirability Code
<i>Achillea millefolium</i>	PF	Perennial Forbs	Yarrow	AS
<i>Agoseris glauca</i>	PF	Perennial Forbs	False Dandelion	AS
<i>Agropyron cristatum</i>	PG	Perennial Grasses	Crested Wheatgrass	AS
<i>Agropyron dasystachyum</i>	PG	Perennial Grasses	Thickspike Wheatgrass	AS
<i>Agropyron elongatum</i>	PG	Perennial Grasses	Tall Wheatgrass	AS
<i>Agropyron intermedium</i>	PG	Perennial Grasses	Intermediate Wheatgrass	AS
<i>Agropyron repens</i>	PG	Perennial Grasses	Quackgrass	AS
<i>Agropyron smithii</i>	PG	Perennial Grasses	Western Wheatgrass	AS
<i>Agropyron spicatum</i>	PG	Perennial Grasses	Bluebunch Wheatgrass	AS
<i>Agropyron</i> spp.	PG	Perennial Grasses	Wheatgrass	AS
<i>Agropyron trachycaulum</i>	PG	Perennial Grasses	Slender Wheatgrass	AS
<i>Agrostis alba</i>	PG	Perennial Grasses	Redtop	AS
<i>Agrostis scabra</i>	PG	Perennial Grasses	Ticklegrass	AS
<i>Agrostis tenuis</i>	PG	Perennial Grasses	Colonial Bentgrass	AS
<i>Allium cernuum</i>	PF	Perennial Forbs	Nodding Onion	AS
<i>Alopecurus pratensis</i>	PG	Perennial Grasses	Meadow Foxtail	AS
<i>Alyssum alyssoides</i>	AF	Annual Forbs	Alyssum	UWS
<i>Alyssum desertorum</i>	AF	Annual Forbs	Alyssum	UWS
<i>Alyssum murale</i>	AF	Annual Forbs	Alyssum	UWS
<i>Amaranthus albus</i>	AF	Annual Forbs	White Pigweed	UWS
<i>Amaranthus retroflexus</i>	AF	Annual Forbs	Pigweed	UWS
<i>Andropogon scoparius</i>	PG	Perennial Grasses	Little Bluestem	AS
<i>Antennaria rosea</i>	PF	Perennial Forbs	Pussy Toes	AS
<i>Arabis glabra</i>	PF	Perennial Forbs	Smooth Rockcress	AS
<i>Arabis holboellii</i>	PF	Perennial Forbs	Rockcress	AS
<i>Arabis</i> sp.	PF	Perennial Forbs	Rockcress	AS
<i>Artemisia absinthium</i>	BF	Biennial Forbs	Wormwood	UWS
<i>Artemisia frigida</i>	SS	Semi-shrubs	Pasture Sagewort	AS
<i>Artemisia longifolia</i>	S	Shrubs	Longleaf Sagewort	AS
<i>Artemisia ludoviciana</i>	PF	Perennial Forbs	Lousiana Sagewort	AS
<i>Artemisia tridentata</i>	S	Shrubs	Big Sagebrush	AS
<i>Aster adscendens</i>	PF	Perennial Forbs	Aster	AS
<i>Aster</i> sp.	PF	Perennial Forbs	Aster	AS
<i>Astragalus adsurgens</i>	PF	Perennial Forbs	Milkvetch	AS
<i>Astragalus cicer</i>	PF	Perennial Forbs	Cicer Milkvetch	AS
<i>Atriplex hastata</i>	AF	Annual Forbs	Orache	UWS
<i>Avena sativa</i>	AG	Annual Grasses	Wild Oats	UWS
<i>Balsamorhiza saggitata</i>	PF	Perennial Forb	Arrowleaf balsamroot	AS
<i>Barbarea orthoceras</i>	AF	Annual Forbs	Barbarea	UWS
<i>Berberis repens</i>	PF	Perennial Forb	Oregon grape	AS
<i>Berteroa incana</i>	AF	Annual Forbs	Berteroa	UWS
<i>Brassica rapa</i>	AF	Annual Forbs	Rape Mustard	UWS
<i>Brassica</i> sp.	AF	Annual Forbs	Rape Mustard	UWS
<i>Bromus biebersteinii</i>	PG	Perennial Grasses	Meadow Brome	AS
<i>Bromus inermis</i>	PG	Perennial Grasses	Smooth Brome	AS
<i>Bromus japonicus</i>	AG	Annual Grasses	Japanese Brome	UWS
<i>Bromus marginatus</i>	PG	Perennial Grasses	Mountain Brome	AS
<i>Bromus tectorum</i>	AG	Annual Grasses	Cheatgrass	UWS
<i>Camelina microcarpa</i>	AF	Annual Forbs	Littleseed False Flax	UWS
<i>Capsella bursa-pastoris</i>	AF	Annual Forbs	Shepherd's Purse	UWS
<i>Cardaria draba</i>	PF	Perennial Forbs	Whitetop	NXW
<i>Carduus nutans</i>	BF	Biennial Forbs	Musk Thistle	UWS



## BSPOU Plant Species Classes

Species Name	Life form Code	Life form Class	Common Name	Desirability Code
ssp. macrolepis				
Centaurea cyanus	AF	Annual Forbs	Bachelor's Buttons	UWS
Cercocarpus ledifolius	S	Shrub	Mountain Mahogany	AS
Chaenactis douglasii	PF	Perennial Forbs	Chaenactis	AS
Chenopodium album	AF	Annual Forbs	Goosefoot	UWS
Chenopodium leptophyllum	AF	Annual Forbs	Narrowleaf Goosefoot	UWS
Chenopodium pratericola	AF	Annual Forbs	Goosefoot	UWS
Chenopodium sp.	AF	Annual Forbs	Goosefoot	UWS
Chrysothamnus nauseosus	S	Shrubs	Rubber Rabbitbrush	AS
Cirsium arvense	PF	Perennial Forbs	Canada Thistle	NXW
Cirsium undulatum	PF	Perennial Forbs	Prairie Thistle	AS
Cleome serrulata	AF	Annual Forbs	Rocky Mountain Bee Plant	AS
Collomia linearis	AF	Annual Forbs	Collomia	AS
Comandra umbellata	PF	Perennial Forbs	Bastard Toadflax	AS
Convolvulus arvensis	PF	Perennial Forbs	Field Bindweed	NXW
Dactylis glomerata	PG	Perennial Grasses	Orchard Grass	AS
Dasiphora fruticosa	S	Shrub	Shrubby Cinquefoil	AS
Deschampsia caespitosa	PG	Perennial Grasses	Tufted Hairgrass	AS
Descurainia pinnata	AF	Annual Forbs	Tansy Mustard	UWS
Descurainia richardsonii	AF	Annual Forbs	Tansy Mustard	UWS
Descurainia sophia	AF	Annual Forbs	Tansy Mustard	UWS
Distichlis spicata	PG	Perennial Grasses	Inland Saltgrass	AS
Douglasia Montana	PF	Perennial Forb	Douglasia	AS
Dracocephalum parviflorum	AF	Annual Forbs	Dragonhead	AS
Echinacea sp.	PF	Perennial Forbs	Purple Prairie Coneflower	AS
Elymus canadensis	PG	Perennial Grasses	Canada Wildrye	AS
Elymus cinereus	PG	Perennial Grasses	Great Basin Wildrye	AS
Elymus junceus	PG	Perennial Grasses	Russian Wildrye	AS
Epilobium angustifolium	PF	Perennial Forbs	Fireweed	AS
Epilobium brachycarpum	AF	Annual Forbs	Willow Herb	AS
Epilobium ciliatum	PF	Perennial Forbs	Willow Herb	AS
Epilobium paniculatum	AF	Annual Forbs	Willow Herb	AS
Erigeron compositus	PF	Perennial Forbs	Daisy Fleabane	AS
Erigeron dissectum	PF	Perennial Forb	Cutleaf daisy	AS
Erigeron pinnatisectus	PF	Perennial Forbs	Daisy Fleabane	AS
Erigeron sp.	PF	Perennial Forbs	Daisy Fleabane	AS
Eriogonum sp.	PF	Perennial Forb	Wild Buckwheat	AS
Erodium cicutarium	PF	Perennial Forbs	Cranesbill	UWS
Erysimum asperum	PF	Perennial Forbs	Western Wallflower	AS
Erysimum repandum	AF	Annual Forbs	Wallflower	AS
Eschscholtzia californica	AF	Annual Forbs	California Poppy	AS
Festuca ovina	PG	Perennial Grasses	Sheep Rescue	AS
Festuca pratensis	PG	Perennial Grasses	Meadow Fescue	AS
Festuca scabrella	PG	Perennial Grasses	Rough Fescue	AS
Filago arvensis	AF	Annual Forbs	Filago	UWS
Fraxinus pennsylvanica	S	Shrub	Mountain Ash	AS
Gaillardia aristata	PF	Perennial Forbs	Blanket Flower	AS
Gayophytum ramosissimum	AF	Annual Forbs	Ground Smoke	AS



## BSPOU Plant Species Classes

Species Name	Life form Code	Life form Class	Common Name	Desirability Code
Geranium viscosissimum	PF	Perennial Forbs	Geranium	AS
Grindelia squarrosa	PF	Perennial Forbs	Curlycup Gumweed	AS
Gypsophila paniculata	PF	Perennial Forbs	Baby's Breath	UWS
Haplopappus acaulis				
Stenotus acaulis	PF	Perennial Forb	yellow tufted daisy	AS
Helianthus annuus	AF	Annual Forbs	Annual Sunflower	UWS
Heliomeris multiflora	PF	Perennial Forbs	Snowy Goldeneye	AS
Heterotheca villosa	PF	Perennial Forbs	Golden Aster	AS
Hordeum jubatum	PG	Perennial Grasses	Foxtail Barley	AS
Iva axillaris	PF	Perennial Forbs	Poverty Sumpweed	AS
Juncus balticus	PG	Perennial Grasses	Baltic Rush	AS
Juniperus horizontalis	S	Shrub	Creeping Juniper	AS
Juniperus scopulorum	T	Trees	Rocky Mountain Juniper	AS
Kochia scoparia	AF	Annual Forbs	Kochia	UWS
Lactuca serriola	AF	Annual Forbs	Prickly Lettuce	UWS
Lappula redowskii	AF	Annual Forbs	Stickseed	UWS
Lepidium densiflorum	AF	Annual Forbs	Pepperweed	UWS
Lepidium perfoliatum	AF	Annual Forbs	Pepperweed (clasping)	UWS
Lepidium ramosissimum	AF	Annual Forbs	Pepperweed	UWS
Linaria dalmatica	PF	Perennial Forbs	Spotted Toadflax	NXW
Linaria vulgaris	PF	Perennial Forbs	Butter and Eggs	UWS
Linum lewisii	PF	Perennial Forbs	Blue Flax	AS
Linum sp.	PF	Perennial Forbs	Flax	AS
Lithospermum rudemale	PF	Perennial Forbs	Puccoon	AS
Lotus corniculatus	PF	Perennial Forbs	Birdsfoot Trefoil	AS
Lupinus sp.	PF	Perennial Forb	Lupine	AS
Lychnis alba	AF	Annual Forbs	Lychnis	AS
Machaeranthera canescens	PF	Perennial Forbs	Machaeranthera	AS
Malva rotundifolia	PF	Perennial Forbs	Cheese Weed	UWS
Matricaria matricarioides	AF	Annual Forbs	Pineapple Weed	UWS
Medicago lupulina	PF	Perennial Forbs	Black Medic	AS
Medicago sativa	PF	Perennial Forbs	Alfalfa	AS
Melilotus alba	BF	Biennial Forbs	White Sweetclover	AS
Melilotus officinalis	BF	Biennial Forbs	Yellow Sweetclover	AS
Mentzelia dispersa	AF	Annual Forbs	Stickleaf	AS
Mentzelia laevicaulis	BF	Biennial Forbs	Evening Star	AS
Oenothera caespitosa	PF	Perennial Forbs	Gumbo Lily	AS
Oenothera villosa	BF	Biennial Forbs	Evening Primrose	AS
Onobrychis viciaefolia	PF	Perennial Forbs	Sanfoin	AS
Onopordum acanthium	BF	Biennial Forbs	Scotch Thistle	UWS
Oryzopsis hymenoides	PG	Perennial Grasses	Indian Ricegrass	AS
Oxytropis sp.	PF	Shrub	Locoweed	AS
Panicum capillare	AG	Annual Grasses	Witchgrass	UWS
Papaver sp.	AF	Annual Forbs	Poppy	AS
Penstemon sp.	PF	Perennial Forbs	Beard Tongue	AS
Phacelia hastata	PF	Perennial Forbs	Phacelia	AS
Phacelia heterophylla	PF	Perennial Forbs	Phacelia	AS
Phleum pratense	PG	Perennial Grasses	Timothy	AS
Pinus contorta	T	Trees	Lodgepole Pine	AS
Pinus flexilis	T	Tree	Limber Pine	AS
Pinus ponderosa	T	Tree	Ponderosa Pine	AS



### BSPOU Plant Species Classes

Species Name	Life form Code	Life form Class	Common Name	Desirability Code
Poa ampla	PG	Perennial Grasses	Big Bluegrass	AS
Poa compressa	PG	Perennial Grasses	Canada Bluegrass	AS
Poa interior	PG	Perennial Grasses	Interior Bluegrass	AS
Poa palustris	PG	Perennial Grasses	Fowl Bluegrass	AS
Poa pratensis	PG	Perennial Grasses	Kentucky Bluegrass	AS
Poa secunda	PG	Perennial Grasses	Sandberg Bluegrass	AS
Poa sp.	PG	Perennial Grasses	Bluegrass	AS
Polygonum aviculare	AF	Annual Forbs	Knotweed	UWS
Polygonum convolvulus	AF	Annual Forbs	Black Blindweed	UWS
Polygonum lapathifolium	AF	Annual Forbs	Knotweed	UWS
Polygonum sawatchense	AF	Annual Forbs	Knotweed	AS
Populus acuminata	T	Tree	black cottonwood	AS
Populus angustifolia	T	Tree	narrowleaf cottonwood	AS
Populus tremuloides	T	Trees	Quaking Aspen	AS
Potentilla norvegica	PF	Perennial Forbs	Cinquefoil	AS
Potentilla sp.	PF	Perennial Forbs	Cinquefoil	AS
Prunus americana	S	Shrubs	Wild Plum	AS
Prunus virginiana	S	Shrubs	Chokecherry	AS
Pseudotsuga menziesii	T	Tree	Douglas Fir	AS
Puccinellia nuttalliana	PG	Perennial Grasses	Alkaligrass	AS
Purshia tridentate	S	Shrub	Bitterbrush	AS
Ratibida columnifera	PF	Perennial Forbs	Prairie Coneflower	AS
Ribes sp.	S	Shrub	gooseberry/currant	AS
Rosa woodsii	S	Shrub	Wild Rose	AS
Rubus ideaus	S	Shrub	raspberry	AS
Rumex acetosella	PF	Perennial Forbs	Sheep Sorrel	UWS
Rumex crispus	PF	Perennial Forbs	Curlyleaf Dock	UWS
Rumex salicifolius	PF	Perennial Forbs	Willowleaf Dock	AS
Rumex sp.	PF	Perennial Forbs	Dock	AS
Salix sp.	S	Shrub	Willows	AS
Salsola iberica	AF	Annual Forbs	Russian Thistle	UWS
Setaria viridis	AG	Annual Grasses	Green Foxtail	UWS
Silene cserei	AF	Annual Forbs	Catchfly	UWS
Silene noctiflora	AF	Annual Forbs	Catchfly	UWS
Silene vulgaris	AF	Annual Forbs	Catchfly	UWS
Sisymbrium altissimum	AF	Annual Forbs	Tumbling Hedge Mustard	UWS
Sisymbrium loeselii	AF	Annual Forbs	Hedge Mustard	UWS
Sitanion hystrix	PG	Perennial Grasses	Squirreltail Grass	AS
Solanum triflorum	AF	Annual Forbs	Nightshade	UWS
Solidago gigantea	PF	Perennial Forbs	Tall Goldenrod	AS
Stipa columbiana	PG	Perennial Grasses	Columbia Needlegrass	AS
Stipa comata	PG	Perennial Grasses	Needle-and-Thread Grass	AS
Stipa sp.	PG	Perennial Grasses	Needlegrass	AS
Stipa viridula	PG	Perennial Grasses	Green Needlegrass	AS
Taraxacum officinale	PF	Perennial Forbs	Common Dandelion	UWS
Thlaspi arvense	AF	Annual Forbs	Pennycress	UWS
Tragopogon dubius	BF	Biennial Forbs	Salsify	UWS
Trifolium hybridum	PF	Perennial Forbs	Alsike Clover	AS
Trifolium pratense	PF	Perennial Forbs	Red Clover	AS
Trifolium repens	PF	Perennial Forbs	White Clover	AS
Triticum aestivum	AG	Annual Grasses	Wheat	UWS
Unknown dicot	PF	Perennial Forbs		AS



**BSPOU Plant Species Classes**

<b>Species Name</b>	<b>Life form Code</b>	<b>Life form Class</b>	<b>Common Name</b>	<b>Desirability Code</b>
Unknown garden scroph	PF	Perennial Forbs		AS
Verbascum thapsus	BF	Biennial Forbs	Common Mullein	UWS
Verbena bracteata	AF	Annual Forbs	Creeping Charlie	UWS
Verbena hastata	PF	Perennial Forbs	Vervain	AS
Vulpia octoflora	AG	Annual Grasses	Six-weeks Fescue	AS
Vaccinium scoparium	S	Shrub	Grouse whortleberry	AS

Notes:  
Lifeform Code:

PG-Perennial Grasses  
AS- Annual Grasses  
PF-Perennial Forbs  
AF- Annual Forbs  
BF-Biennial Forbs  
SS- Semi-shrubs  
S-Shrubs  
T- Trees

Desirability Code:

AS-Acceptable species.  
UWS- Undesirable weedy  
species  
NXS-Noxious weeds



## BRES Appendix H

### Noxious Weed List for Montana and Butte- Silver Bow County



### Noxious Weed List for Montana and Butte-Silver Bow County

#### Category I

Category I noxious weeds are weeds that are currently established and generally widespread in many counties of the state. Management criteria include awareness and education, containment and suppression of existing infestations, and prevention of new infestations. These weeds are capable of rapid spread and render land unfit or greatly limit beneficial uses.

- leafy spurge *Euphorbia esula*
- Canada thistle *Cirsium arvense*
- Russian knapweed *Centaurea repens*
- spotted knapweed *Centaurea maculosa*
- diffuse knapweed *Centaurea diffusa*
- field bindweed *Convolvulus arvensis*
- whitetop (hoary cress) *Cardaria draba*
- Dalmatian toadflax *Linaria dalmatica*
- St. Johnswort (goatweed) *Hypericum perforatum*
- sulfur cinquefoil *Potentilla recta*
- common tansy *Tanacetum vulgare*
- oxeye daisy *Chrysanthemum leucanthemum* L.
- houndstongue *Cynoglossum officinale* L.

#### Category II

Category II noxious weeds have recently been introduced into the state or are rapidly spreading from their current infestation sites. These weeds are capable of rapid spread and invasion of lands, rendering lands unfit for beneficial uses. Management criteria include awareness and education, monitoring and containment of known infestations and eradication where possible.

- dyer's woad *Isatis tinctoria*
- purple loosestrife or lythrum *Lythrum salicaria* or *Lythrum virgatum*
- tansy ragwort *Senecio jacobaea* L.
- meadow hawkweed complex *Hieracium pratense*, *H. floribundum*, *H. piloselloides*
- orange hawkweed *Hieracium aurantiacum* L.
- tall buttercup *Ranunculus acris* L.
- tamarisk (saltcedar) *Tamarix* spp.



Category III

Category III noxious weeds have not been detected in the state or may be found only in small, scattered, localized infestations. Management criteria include awareness and education, early detection and immediate action to eradicate infestations. These weeds are known pests in nearby states and are capable of rapid spread and render land unfit for beneficial uses.

- yellow starthistle                      *Centaurea solstitialis*
- common crupina                      *Crupina vulgaris*
- rush skeletonweed                      *Chondrilla juncea*

Category IV

County (Butte-Silver Bow County) declared noxious weeds.

- Baby's breath                      *Gysophila paniculata*
- Wild caraway                      *Carum carvi*
- Matrimony vine                      *Lycium balimisolium* L.



## BRES Appendix I

### BRES Erosion Condition Class Determination



## BRES EROSION CONDITION CLASS DETERMINATION

SURFACE LITTER	No movement, or if present, less than 2 percent of the unattached litter has been translocated and redeposited against obstacles. 0 or 3	Between 2 and 10 percent of the unattached litter has been translocated and redeposited against obstacles. 6	Between 10 and 25 percent of the unattached litter has been translocated and redeposited against obstacles. 8	Between 25 and 50 percent of the unattached litter has been translocated and redeposited against obstacles. 11	More than 50 percent of the unattached litter has been translocated and redeposited against obstacles. 14
SURFACE ROCK MOVEMENT	No movement, or if present, less than 2 percent of the surface rock fragments show localized concentration. 0 or 2	Between 2 and 10 percent of the surface rock fragments show localized concentration. 5	Between 10 and 25 percent of the surface rock fragments show localized concentration. 8	Between 25 and 50 percent of the surface rock fragments show localized concentration. 11	More than 50 percent of the surface rock fragments show localized concentration. 14
PEDESTALLING	Pedestals are mostly less than 0.1 inches (2.5 mm) high and/or less frequent than 2 pedestals per 100 sq. ft. 0 or 3	Pedestals are mostly between 0.1 to 0.3 inches (2.5 to 8 mm) high and/or have a frequency of 2 to 5 pedestals per 100 sq. ft. 6	Pedestals are mostly between 0.3 and 0.6 inches (8 to 15 mm) high, and/or have a frequency of 5 to 7 pedestals per 100 sq. ft. 9	Pedestals are mostly between 0.6 to 1 inch (15 to 25 mm) high, and/or have a frequency of 7 to 10 pedestals per 100 sq. ft. 11	Pedestals are mostly over 1 inch (25 mm) high, and/or have a frequency of over 10 pedestals per 100 sq. ft. 14
FLOW PATTERNS	None, or if present, less than 2 percent of the surface area shows a flow pattern in which water flows over the ground surface for a distance at least 10 linear feet. 0 or 3	Between 2 and 10 percent of the surface area shows a flow pattern in which water flows over the ground surface for a distance of at least 10 linear feet. 6	Between 10 and 25 percent of the surface area shows a flow pattern in which water flows over the ground surface for a distance of at least 10 linear feet. 9	Between 25 and 50 percent of the surface area shows a flow pattern in which water flows over the ground surface for a distance of at least 10 linear feet. 12	Over 50 percent of the surface area shows a flow pattern in which water flows over the ground surface for a distance of at least 10 linear feet. 15
RILLS depth	Rills, if present, are mostly less than 0.5 in. (13mm) deep 0 to 2	Rills are mostly 0.5 to 1 in. (13mm to 25mm) deep. 3	Rills are mostly 1 to 1.5 in. (25mm to 38mm) deep. 4 to 5	Rills are mostly 1.5 to 3 in. (38mm to 76mm) deep. 6	Rills are mostly 3 to 6 in. (76mm to 152mm) deep. 7
RILLS frequency	Rills, if present, are generally found at intervals over 15 ft. 0 to 2	Rills, if present, are generally found at intervals over 10 ft. 3	Rills, if present, are generally found at intervals over 5 ft. 4 to 5	Rills, if present, are generally found at intervals between 2 to 5 ft. 6	Rills, if present, are generally found at intervals between 0 to 2 ft. 7
GULLIES depth	Gullies, if present, less than 2 percent of the channel bed and walls show active erosion. 0 to 2	Between 2 and 5 percent of the channel bed and walls show active erosion. 3	Between 5 and 10 percent of the channel bed and walls show active erosion. 4 to 5	Between 10 and 50 percent of the channel bed and walls show active erosion. 6	Over 50 percent of the channel bed and walls show active erosion. 7
GULLIES frequency	Gullies, if present, make up less than 2 percent of the area. 0 to 2	Gullies make up between 2 to 5 percent of the total area. 3	Gullies make up between 5 to 10 percent of the total area. 4 to 5	Gullies make up between 10 to 50 percent of the total area. 6	Gullies make up greater than 50 percent of the total area. 7
SOIL MOVEMENT	Depth of deposits around obstacles is between 0 and 0.1 inches (0 to 2.5 mm). 0 or 3	Depth of deposits around obstacles is between 0.1 and 0.2 inches (2.5 to 5mm). 5	Depth of deposits around obstacles 0.2 and 0.4 inches (5 to 10 mm) 8	Depth of deposits around obstacles is between 0.4 and 0.8 inches (10 to 20 mm). 11	Depth of deposits around obstacles is over 0.8 inches (20 mm). 14



The complete Responsiveness Summary, which responds to comments on the Proposed Plan for the 2006 Record of Decision, can be accessed by going to the following web page:

<https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.scs&id=0800416&doc=Y&colid=32795&region=08&type=SC>

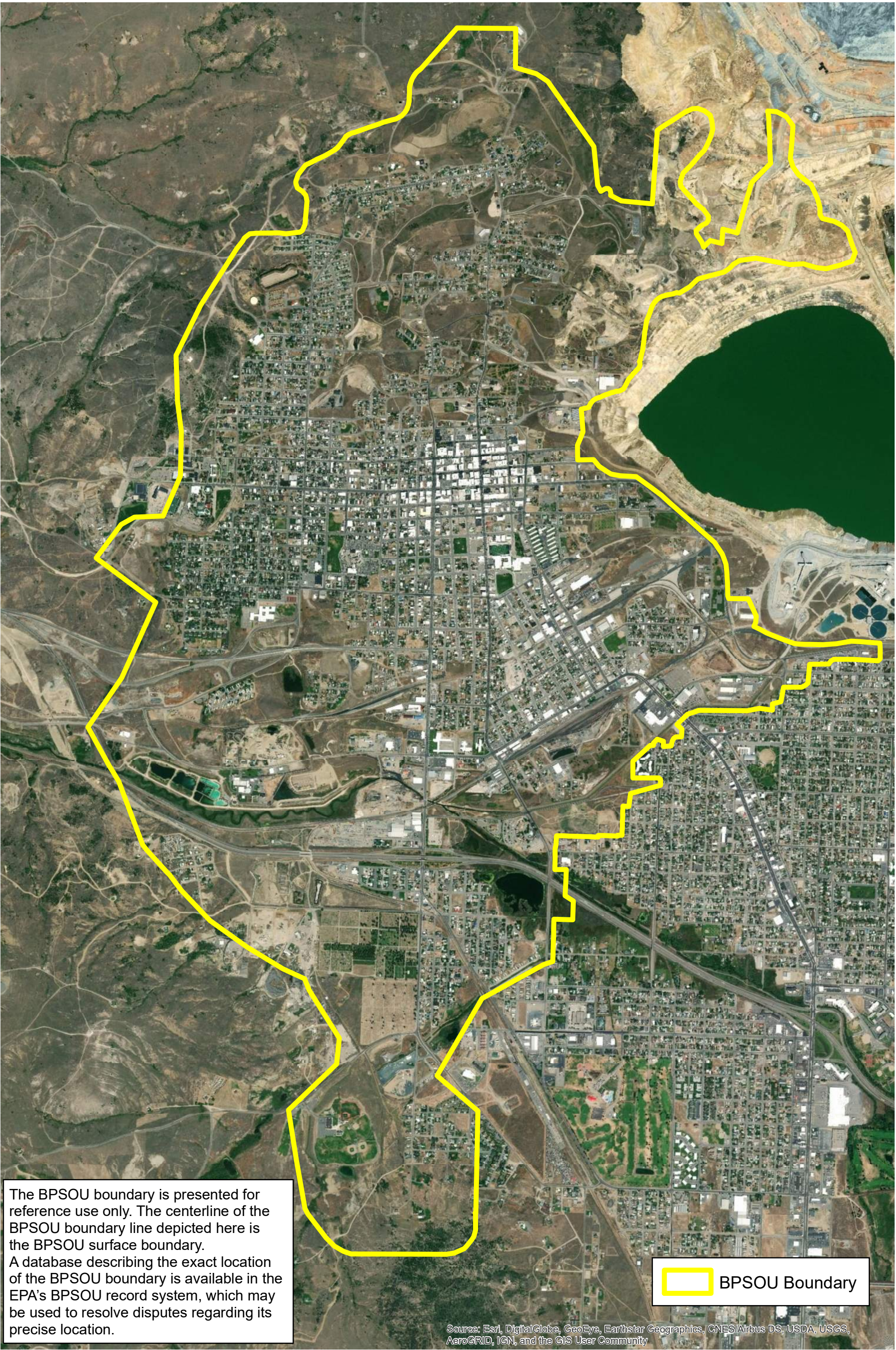
and searching for document number **1917471**.



**FIGURE OF THE BPSOU SURFACE BOUNDARY**  
**for the**  
**BUTTE PRIORITY SOILS OPERABLE UNIT**  
**of the**  
**SILVER BOW CREEK / BUTTE AREA SUPERFUND**  
**SITE**  
**Butte-Silver Bow County, Montana**

**APPENDIX B**  
**TO THE CONSENT DECREE**







**SUBDRAIN FIGURES**

**for the**

**BUTTE PRIORITY SOILS OPERABLE UNIT**

**of the**

**SILVER BOW CREEK / BUTTE AREA SUPERFUND**

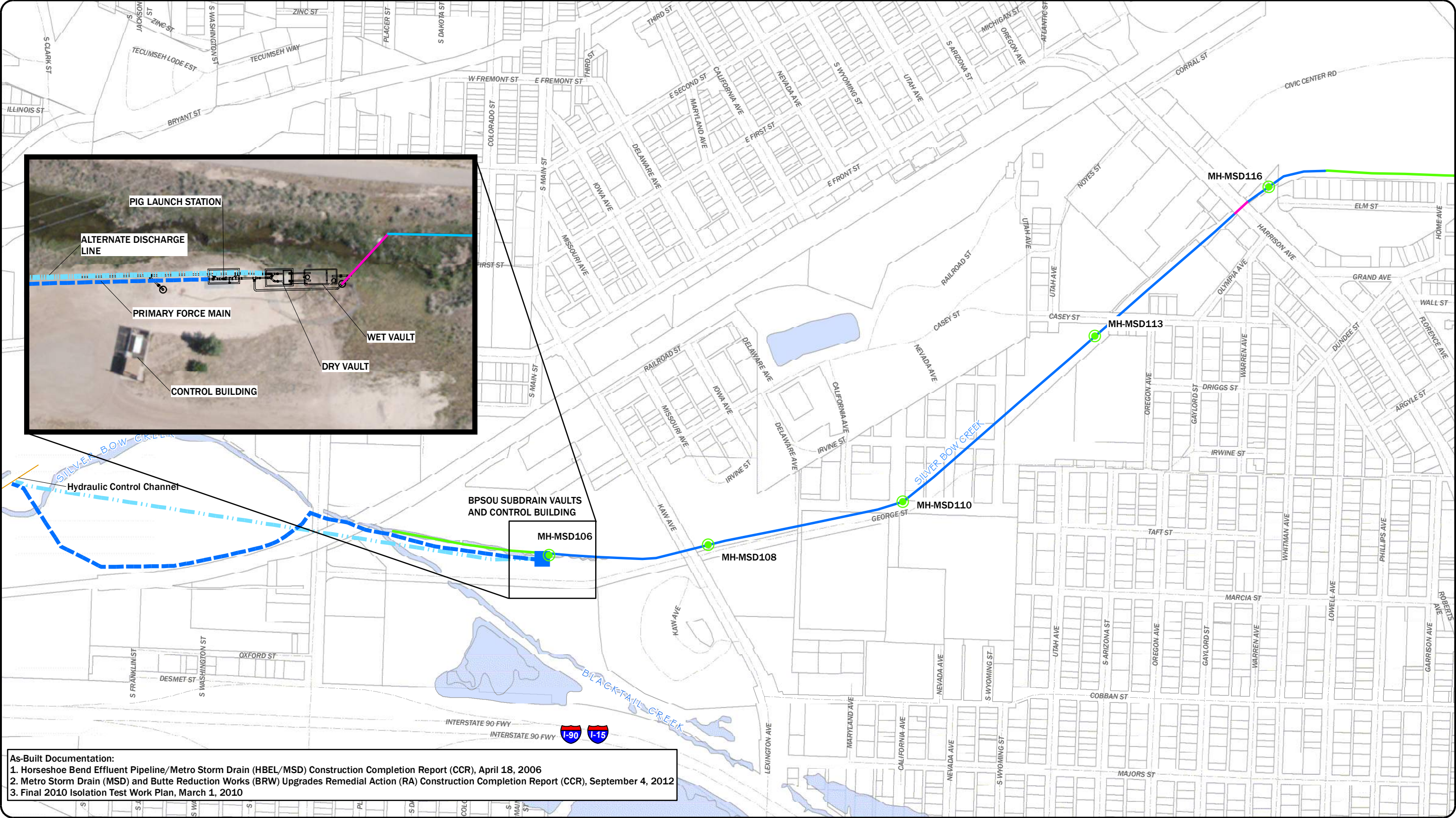
**SITE**

**Butte-Silver Bow County, Montana**

**APPENDIX C**

**TO THE CONSENT DECREE**





**LEGEND**

- Manhole
- BPSOU Subdrain Vault
- BPSOU Subdrain With Slotted Pipe and Gravel Pack
- BPSOU Subdrain Without Slotted Pipe and No Gravel
- SBC Without Subdrain
- Primary Force Main
- Alternate Discharge Line

**Note:**  
ACTUAL DIMENSIONS AND MEASUREMENTS OF SBC AND THE BPSOU SUBDRAIN AND ITS RELATED APPURTENANCES MAY VARY FROM THOSE INDICATED ON THIS FIGURE. PLEASE REFERENCE AS-BUILT DOCUMENTATION.

DISPLAYED AS:  
PROJECTION/ZONE: MSP  
DATUM: NAD 83  
UNITS: INT'L FEET  
SOURCE: PIONEER/GOOGLE MAPS

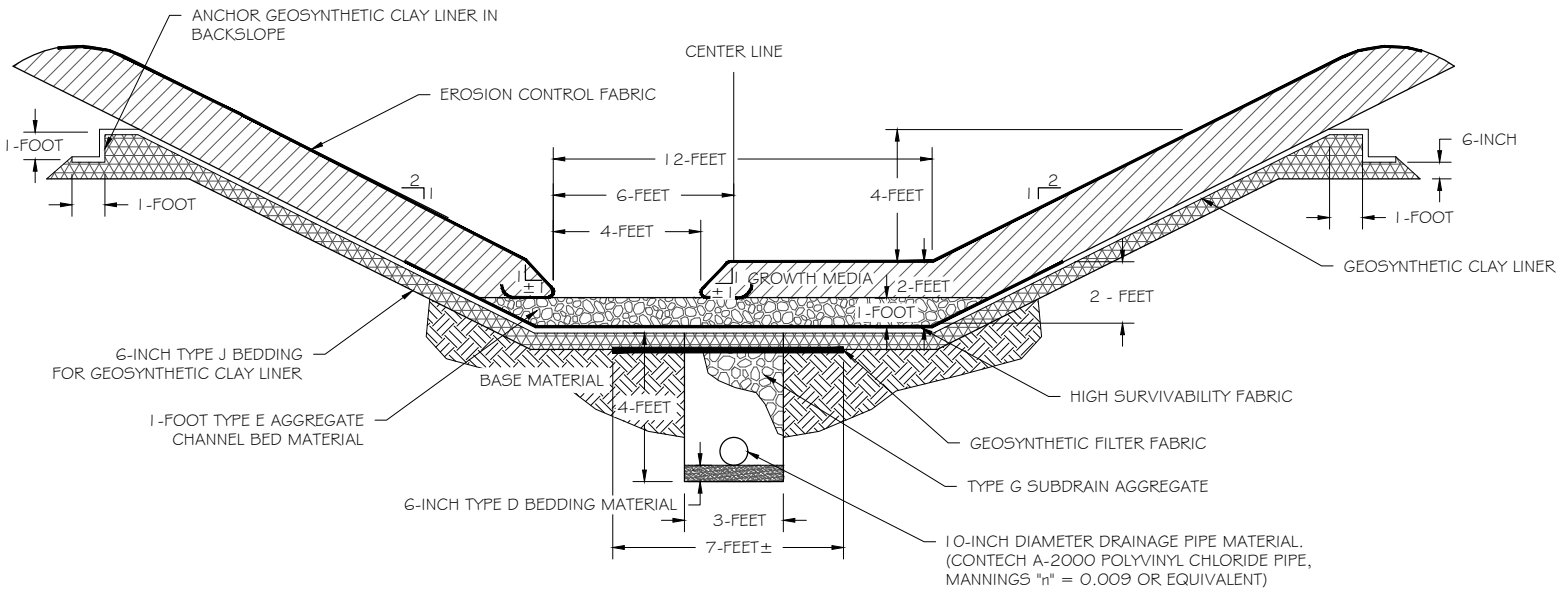
0 250 500 1,000  
Feet

**APPENDIX C - FIGURE 1**

**BPSOU SUBDRAIN SITE MAP**

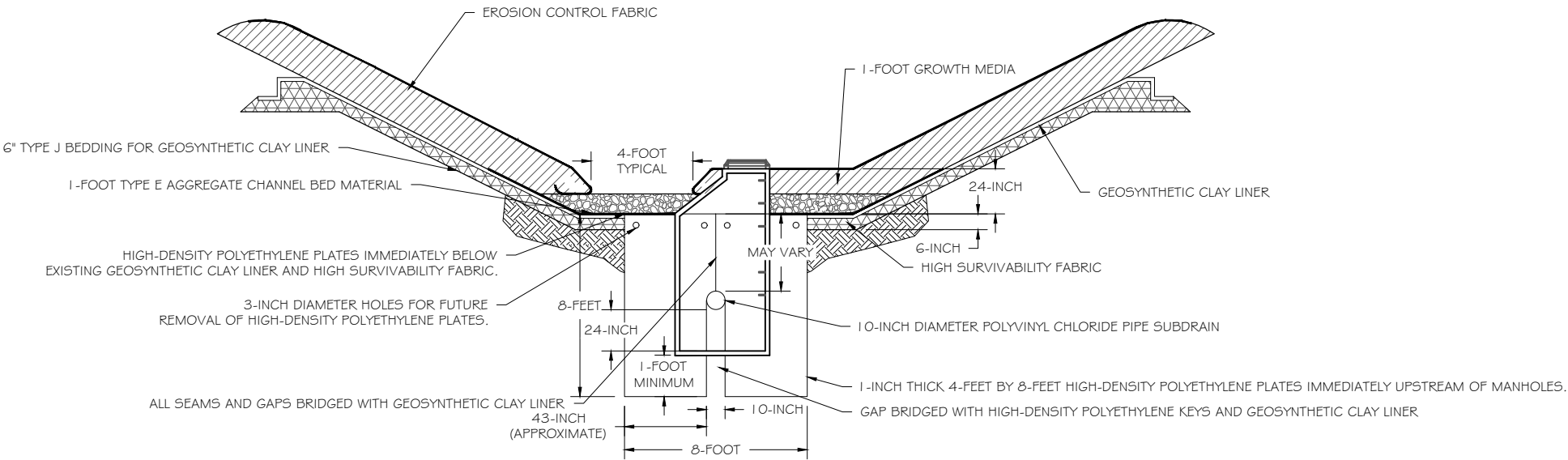
DATE: 9/30/2019





TYPICAL SILVER BOW CREEK BPSOU SUBDRAIN AS-BUILT SECTION

NOT TO SCALE



HIGH-DENSITY POLYETHYLENE PLATE INSTALLATION AND TYPICAL CHANNEL SECTION DETAIL

NOT TO SCALE

As-Built Documentation:

1. Horseshoe Bend Effluent Pipeline/Metro Storm Drain (HBEL/MSD) Construction Completion Report (CCR), April 18, 2006
2. Metro Storm Drain (MSD) and Butte Reduction Works (BRW) Upgrades Remedial Action (RA) Construction Completion Report (CCR), September 4, 2012
3. Final 2010 Isolation Test Work Plan, March 1, 2010

NOTE:

ACTUAL DIMENSIONS AND MEASUREMENTS OF SILVER BOW CREEK AND THE BPSOU SUBDRAIN AND ITS RELATED APPURTENANCES MAY VARY FROM THOSE INDICATED ON THIS FIGURE. PLEASE REFERENCE AS-BUILT DOCUMENTATION.

DISPLAYED AS:  
COORD SYS/ZONE:  
DATUM:  
UNITS:  
SOURCE: PIONEER

SCALE IN FEET  
0 NOT TO SCALE

APPENDIX C - FIGURE 2  
BPSOU SUBDRAIN  
TYPICAL SECTION AND  
MANHOLE DETAIL

DATE: 8/2019



**BPSOU STATEMENT OF WORK**  
**for the**  
**BUTTE PRIORITY SOILS OPERABLE UNIT**  
**of the**  
**SILVER BOW CREEK / BUTTE AREA SUPERFUND**  
**SITE**  
**Butte-Silver Bow County, Montana**

**APPENDIX D**  
**TO THE CONSENT DECREE**



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**TABLE OF CONTENTS**

<b>1.0</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	Purpose of the SOW.....	1
1.2	Structure of the SOW .....	1
1.3	Scope of the Remedy .....	1
1.4	Relation to Previously Completed BPSOU Site Work .....	4
1.5	Ongoing Remedial Elements .....	5
1.6	Further Remedial Elements to be Implemented.....	7
1.7	DEQ Participation.....	7
1.8	BPSOU Site Decision Documents .....	8
1.9	Definitions and Abbreviations .....	8
<b>2.0</b>	<b>COMMUNITY INVOLVEMENT .....</b>	<b>9</b>
2.1	Community Involvement Responsibilities.....	9
<b>3.0</b>	<b>REMEDIAL DESIGN .....</b>	<b>10</b>
3.1	RD Work Plans .....	10
3.2	Periodic Meetings .....	10
3.3	Pre-Design Investigations .....	10
3.4	Preliminary (30%) RDs.....	11
3.5	Intermediate (60%) RDs .....	11
3.6	Pre-Final (95%) RDs.....	12
3.7	Final (100%) RDs .....	12
<b>4.0</b>	<b>REMEDIAL ACTION .....</b>	<b>13</b>
4.1	RA Work Plans .....	13
4.2	Implementation and Construction Of Work Elements Included In The Remedial Designs.....	13
4.3	Meetings and Inspections.....	13
4.4	Emergency Response and Reporting .....	14
4.5	Off-Site Shipments.....	15
4.6	RA Construction Completion. ....	15
4.7	Certification of RA Completion.....	16
4.8	Periodic Review Support Plan (PRSP) .....	18
4.9	Certification of Work Completion.....	18
<b>5.0</b>	<b>REPORTING .....</b>	<b>20</b>
5.1	Progress Reports .....	20
5.2	Notice of Progress Report Schedule Changes. ....	20
<b>6.0</b>	<b>DELIVERABLES .....</b>	<b>21</b>
6.1	Applicability .....	21
6.2	In Writing.....	21
6.3	General Requirements for Deliverables.....	21
6.4	Technical Specifications .....	21
6.5	Certification .....	22
6.6	Approval of Deliverables.....	22
6.7	Supporting Deliverables.....	23



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

<b>7.0</b>	<b>SCHEDULES .....</b>	<b>27</b>
7.1	Applicability and Revisions .....	27
7.2	RD and RA Schedules .....	27
<b>8.0</b>	<b>STATE PARTICIPATION .....</b>	<b>28</b>
8.1	Copies .....	28
8.2	Review and Comment .....	28
<b>9.0</b>	<b>REFERENCES.....</b>	<b>29</b>
9.1	Regulations and Guidance Documents. ....	29
9.2	EPA Web Pages .....	30
9.3	Other Regulations and Guidance .....	31

**LIST OF EXHIBIT AND ATTACHMENTS**

Exhibit 1	Remedial Design/Remedial Action Schedule for the Further Remedial Elements Scope of Work
Attachment A	BPSOU Surface Water Compliance Determination Plan
Attachment B	2019 Status for the 2011 Unilateral Administrative Order Work Plan for BPSOU Partial Remedial Design/Remedial Action Implementation
Attachment B.1	Ongoing Remedial Elements Scope of Work
Attachment C	Further Remedial Elements Scope of Work
Attachment D	Description of the Wet Weather Remedial Element



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **1.0 INTRODUCTION**

### **1.1 Purpose of the BPSOU SOW**

This Statement of Work (BPSOU SOW) sets forth the procedures and requirements for implementing the Work.

### **1.2 Structure of the BPSOU SOW**

- (a) Section 2.0 (Community Involvement) sets forth EPA's and Settling Defendants' (SDs') responsibilities for community involvement.
- (b) Section 3.0 (Remedial Design) sets forth the process for developing the RD, which includes the submission of specified primary deliverables.
- (c) Section 4.0 (Remedial Action) sets forth requirements regarding the completion of the RA, including primary deliverables related to completion of the RA.
- (d) Section 5 (Reporting) sets forth SDs' reporting obligations.
- (e) Section 6 (Deliverables) describes the content of the supporting deliverables and the general requirements regarding SDs' submission of, and EPA's review of, approval of, comment on, and/or modification of, the deliverables.
- (f) Section 7 (Schedules) sets forth the schedule for submitting the primary deliverables, specifies the supporting deliverables that must accompany each primary deliverable, and sets forth the schedule of milestones regarding the completion of the RA.
- (g) Section 8 (State Participation) addresses State participation.
- (h) Section 9.0 (References) provides a list of references, including URLs.

### **1.3 Scope of the Remedy**

The Scope of the Remedy is the response actions described in Section 12 of the 2006 Butte Priority Soils Operable Unit Record of Decision (2006 ROD), and includes the modifications to the Remedy made in Section 3 of the 2011 Explanation of Significant Differences (ESD) and modifications to the Remedy made in Sections 4, 5, and Appendix A of the 2020 ROD Amendment, as further defined in this Section 1.3. The Scope of the Remedy under this Section 1.3 does not include the Remedy for the Railroad Properties or the Residential Solid Media Remedial Action, and EPA will use other enforcement mechanisms to implement those components of the Remedy. The Scope of the Remedy is:

- (a) All actions described in the Further Remedial Elements Scope of Work (Scope of Work, Attachment C [hereinafter Attachment C]). Additional information concerning the Scope of the Remedy as it pertains to acute or chronic in-stream water quality Performance Standards is found in the BPSOU Surface Water Compliance Determination Plan (Attachment A to this BPSOU SOW, [hereinafter Attachment A]);



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

(b) Contaminated Solid Media<sup>1</sup>-

- (1) BRES: The construction and maintenance of vegetated caps in a manner consistent with the Butte Reclamation Evaluation System (BRES) at sites impacted by historic mining activities, consistent with desired end land use for that area; and
- (2) Butte Mine Waste Repository: The expansion, operation, closure and post-closure operation and maintenance of the Butte Mine Waste Repository, and other mine waste repositories developed during RD.

(c) Contaminated Groundwater

- (1) Collect contaminated groundwater (alluvial and West Camp bedrock) consistent with the ROD (which includes a groundwater Performance Standard technical impracticability waiver for a defined area, as measured at defined points of compliance, in quantity and in locations sufficient to: (i) support compliance with in-stream surface water Performance Standards (including Replacement Standards), (ii) protect in-stream sediment quality, assessed using the protocols in the Surface Water Management Plan; and (iii) prevent expansion of areas of contaminated groundwater. Treatment of contaminated groundwater is addressed in subparagraph 1.3(e) (Water Treatment) and control and treatment of contaminated groundwater to protect surface water is addressed in subparagraph 1.3(d) (Contaminated Surface Water).

(d) Contaminated Surface Water

- (1) Addressing contaminants of concern from historic mining activities, including solid media, and including the control and treatment of contaminated groundwater and the collection and treatment of storm water through the BMPs set forth in this BPSOU SOW and its attachments. This also includes the discharge of collected and treated groundwater as necessary to support compliance with end-of-pipe Performance Standards and in-stream surface water Performance Standards, including Replacement Standards. A more specific definition of the Scope of the Remedy for contaminated surface water, which contains specific Scope of the Remedy parameters for response to an exceedance of in-stream Performance Standards, is described in section 1.3(d)(2) and (3) below.
- (2) To mitigate exceedances of acute in-stream Performance Standards, the Scope of the Remedy includes the Optimization Elements listed in

---

<sup>1</sup> The Residential Solid Media Remedial Action component of the Remedy is not addressed in this Partial RD/RA Statement of Work or the Consent Decree. The EPA will use other enforcement mechanisms to implement this component of the Remedy.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

subparagraphs (d)(2)(i) through (d)(2)(iii) only, as described below. Nothing in this BPSOU SOW Section 1.3 prevents the Settling Defendants from considering these Optimization Elements in design, and the elements that are supported by the design engineering analysis will be installed in addition to the Work outlined in Attachment C, to allow for post-construction optimization of the surface water remedy. The Scope of the Remedy does not include major infrastructure modifications except as defined below after KRECCR approval to construct any Optimization Elements (e.g., Multi-Basin Networking) that would require the demolition or reconstruction of previously completed Remedial Elements. The Optimization Elements are:

- (i) Adjustable Diversion and Outlet Structures. Diversion and outlet structures will integrate removable weir plates or stop logs, adjustable screw gates, and/or variable diameter and elevation orifice outlets, as appropriate, to manipulate retained/detained volume and discharge rate at the primary basin discharge point and potentially within each basin's respective forebay.
  - (ii) Basin Segregation. The interior of the basins may be segregated to promote confinement of sediment accumulation, to optimize the treatment flow path, and to enhance future land use. Segregation could be completed by general grading, development of micro-pools, construction of berms or structural walls, or installation of turbidity curtains. As appropriate, adjustable outlet structures would be installed similar to those discussed in Optimization Element 1.
  - (iii) Logic and Controls. Logic and controls will be considered during the final design process. Control and monitoring devices may accommodate automated system adjustment based upon measured surface water quality at each respective BMP discharge and/or at the Silver Bow Creek compliance monitoring point. A supervisory control and data acquisition (SCADA) system with programmable logic controller(s), proportional-integral-derivative (PID) controllers, and communication systems would be installed and networked as needed to provide necessary operational function.
- (3) To mitigate exceedances of chronic in-stream Performance Standards, the Scope of the Remedy includes only:
- (i) Optimization of BPSOU groundwater interception, control and treatment structures and systems in place after Remedy construction, such as system enhancements, installation of extraction wells, and/or expanded interception of impacted groundwater, or enhancement of treatment facility operations;



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- (ii) Capping and/or revegetation of an Historic Mine Waste Source within the Corridor, as defined in Section 7.0 of Attachment A; and
  - (iii) Removal of contaminated in-stream sediments, in accordance with the protocols set forth in the BPSOU Surface Water Management Plan, Exhibit 1 of Attachment A (SWMP), determined to be impacted by groundwater in contact with a Historic Mine Waste Source or re-contaminated by a Historic Mine Waste Source, as defined in Section 7.0 in Attachment A, utilizing the diagnostic evaluation process described in the SWMP. Other than removal of in-stream sediments, no removal or excavation of any Historic Mine Waste can be required (the term “Historic Mine Waste Source” is defined in Attachment A). However, the Settling Defendants may propose additional removal or excavation at any time.
- (e) Groundwater Treatment
  - (1) Construction and operation of the Butte Treatment Lagoons (BTL System) as the water treatment facility under Remedy to treat contaminated groundwater such that shakedown conditions are met and BTL System Performance Standards presented in Attachment A are not violated.
- (f) Institutional Controls
  - (1) The establishment and maintenance of appropriate institutional controls to protect remedial components and to provide notice of remedial activity on the property (e.g., Source Area Property), as generally described in the approved Institutional Controls Implementation and Assurance Plan for the BPSOU (ICIAP) (Appendix E to the Consent Decree);
  - (2) Prevention of domestic and irrigation use of contaminated groundwater by administering the existing Controlled Groundwater Area;
  - (3) Controlling contaminants of concern in storm water by implementing appropriate reporting, stormwater ordinance and permit requirements; and
  - (4) Protecting future owners and occupants from exposure to contaminated solid media using deed restrictions and/or easements at all remediated areas and through enforcement of local ordinances (e.g., *Excavation and Dirt-Moving Protocols for All Dirt-work to be Performed in and Near the Butte Area Superfund Sites*).
- (g) Operation and maintenance of remedy elements
  - (1) Developing long-term operations and maintenance plans for all aspects of the remedy with the goal of achieving and thereafter maintaining compliance with the ROD and Performance Standards; and



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- (2) Developing and implementing long-term, comprehensive monitoring programs for surface water (including storm water), groundwater, and reclamation areas.

#### **1.4 Relation to Previously Completed BPSOU Site Work**

Settling Defendants have previously completed approved remedial activities at the BPSOU pursuant to the existing unilateral administrative order titled “Administrative Order for Partial Remedial Design/Remedial Action Implementation and Certain Operation and Maintenance Activities at the Butte Priority Soils Operable Unit, EPA Docket No. CERCLA-08-2011-0011”, issued on July 20, 2011 (2011 Order). This BPSOU SOW is intended to facilitate the continuation of BPSOU remedial activities, obligations and requirements contained in the “Partial Remedy Implementation Work Plan” (2011 WP), attached to the 2011 Order, including previously completed work plans or other deliverables. All Responsible Party and Group 1 Responsible Party plans or deliverables previously approved by EPA, in consultation with DEQ, pursuant to the 2011 Order and the 2011 PRI Work Plan are incorporated by reference (see Attachment B, 2019 Status of 2011 PRI Work Plan Requirements [hereinafter Attachment B]) and are fully enforceable under this BPSOU SOW, except for approved Residential Solid Media Remedial Action work plans, which are outside this BPSOU SOW. Certain pending Responsible Party and Group 1 Responsible Party deliverables under the 2011 PRI Work Plan are also requirements of this BPSOU SOW and are subject to the agency review and approval requirements of the Consent Decree and this BPSOU SOW. Those requirements and obligations are described in Attachment B.1, Ongoing Remedial Elements Scope of Work (hereinafter Attachment B.1.).

#### **1.5 Ongoing Remedial Elements**

Certain remedy components described in the ROD have been partially or completely implemented. The status of these components is described in Attachment B, and ongoing remedial element requirements are contained in Attachment B.1. Certain Work required under the 2011 WP is ongoing and is generally described below:

- (a) Solid Media
  - (1) Residential Contamination
    - (i) Residential Solid Media Remedial Action, currently implemented through the RMAP Implementation (not Work for purposes of this Consent Decree)
  - (2) Non-Residential Solid Media Program
    - (i) BRES Program
- (b) Groundwater
  - (1) Groundwater (GW) Management Plan
    - (i) Site-wide Groundwater Monitoring
    - (ii) Controlled Groundwater Area Monitoring
    - (iii) Groundwater Load Monitoring for the BPSOU Subdrain



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- (iv) Butte Treatment Lagoons, West Camp, and BPSOU Subdrain Groundwater Capture System Operation, Maintenance and Monitoring
  - (2) BPSOU Subdrain Groundwater Management Report
  - (3) Localized Groundwater Study
  - (4) Butte Reduction Works Groundwater and Surface Water Monitoring
- (c) Surface Water
- (1) Surface Water Management Plan
    - (i) Site-wide Surface Water Monitoring
- (d) Institutional Controls/Historic Preservation Requirements
- (1) Monitor and Enforcement
    - (i) Settling Defendants' ICIAP (Appendix E to the Consent Decree);
    - (ii) Controlled Groundwater Area Requirements
    - (iii) Historic Preservation Programmatic Agreements (1<sup>st</sup> and 2<sup>nd</sup> )
    - (iv) Applicable County Ordinances
    - (v) Deed Restrictions
- (e) Operations and Maintenance (O&M) and Management Plans – the following are a list of documents in progress or development, or previously approved O&M Plans.
- (1) Butte Treatment Lagoons (BTL), West Camp, and BPSOU Subdrain Groundwater Capture System – Draft submitted by the SDs - under review by the agencies.
  - (2) BRES Sites – Draft submitted by SDs; Agencies have partially reviewed and further BRES-related documents that are part of the Solid Media Management Plan will be submitted for agency review and approval.
  - (3) Mine Waste Repository – Approved on September 23, 2015.
  - (4) Granite Mountain Memorial Interpretive Area (GMMIA) – Included in the Mine Waste Repository O&M Manual that was approved on September 23, 2015.
  - (5) Syndicate Pit - Included in the Stormwater System O&M Plan that was approved on August 6, 2018.
  - (6) BPSOU Subdrain Evaluation Report and BPSOU Subdrain Optimization Report – to be prepared by SDs for EPA approval, in consultation with DEQ, after relevant remedial work is completed.
  - (7) Superfund Stormwater System O&M Plan – Approved August 7, 2018.
  - (8) Butte Silver Bow County (BSBC) Street Maintenance and Snow Management Plan – Draft submitted by SDs; Agency comments have been provided to SDs, and revised draft shall be submitted for Agency review and approval.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- (9) Missoula Gulch Catch Basins (CB-1, CB-8 and CB-9) – Approved on July 19, 2018. This is an appendix to the Superfund Stormwater System O&M Plan that was approved on August 7, 2018.
- (10) Silver Bow Creek above the confluence with Blacktail Creek (formerly known as the Metro Storm Drain (MSD)) Channel O&M Plan - Draft due from the SDs.
- (11) RARUS Railway BPSOU Superfund O&M Plan – draft submitted by SDs for Agency review and approval; under review by the agencies.

Attachment B.1 to this BPSOU SOW, describes the requirements and criteria for all the remedial actions listed in this section and is incorporated into this BPSOU SOW by reference.

#### **1.6 Further Remedial Elements to be Implemented**

In order to complete the BPSOU remedy, the following remaining remedial elements shall be implemented. These are subject to remedial design requirements described in Section 3 and the remedial action requirements described in Section 4. These include:

- (a) Diggings East Stormwater Basin Area;
- (b) Buffalo Gulch Stormwater Basin(s);
- (c) Northside Tailings / East Buffalo Gulch Area;
- (d) Grove Gulch Sedimentation Bay;
- (e) Blacktail Creek Remediation and Contaminated Groundwater Hydraulic Control;
- (f) Butte Reduction Works Smelter Area Mine Waste Remediation and Contaminated Groundwater Hydraulic Control;
- (g) Insufficiently Reclaimed Source Areas;
- (h) Unreclaimed Solid Media Sites; and
- (i) Uncontrolled Surface Flow Area BMPs.

Attachment C to this BPSOU SOW, describes the overall requirements and criteria for these actions and is incorporated into this BPSOU SOW by reference. Section 5 of Attachment C, Blacktail Creek Remediation and Contaminated Groundwater Hydraulic Control, describes specific remedial activities in the Blacktail Creek area to be performed by DEQ. The requirements for implementation of BTC Riparian Actions are further described in Exhibit H to the Consent Decree, BTC Riparian Actions Outline.

Items (a) through (d) and item (i) above constitute the remaining portions of the Wet Weather Remedy component described in the ROD. The information and terms found in Attachment D to this BPSOU SOW, Description of Wet Weather Remedial Element, describe this element in more detail and is also incorporated into this BPSOU SOW by reference.

#### **1.7 DEQ Participation**

Consistent with relevant provisions of CERCLA, EPA will consult with DEQ in making all significant decisions regarding the requirements of the Consent Decree and this BPSOU SOW. References to any EPA approval in this BPSOU SOW



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

therefore means that the approval is by EPA *in consultation with the DEQ*, even when DEQ is not explicitly mentioned. The Parties shall accordingly ensure that DEQ has a reasonable opportunity (not to exceed thirty days) to review and comment upon all deliverables to ensure that it can meet its consultation obligation in a timely fashion.

**1.8 BPSOU Site Decision Documents**

- (a) 2006 BPSOU ROD – Record of Decision, Butte Priority Soils Operable Unit, September 2006.
- (b) 2011 ESD - Explanation of Significant Differences to the 2006 Butte Priority Soils Operable Unit Record of Decision, July 2011.
- (c) 2020 ROD Amendment, November 2020.

**1.9 Definitions and Abbreviations**

The terms used in this BPSOU SOW that are defined in CERCLA, in regulations promulgated under CERCLA, or in the Consent Decree (CD), have the meanings assigned to them in CERCLA, in such regulations, or in the CD, except that the term “Paragraph” or “¶” used in this document means a paragraph of the BPSOU SOW, and the term “Section” used in this document means a section of the BPSOU SOW, unless otherwise stated.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## 2.0 COMMUNITY INVOLVEMENT

### 2.1 Community Involvement Responsibilities

- (a) EPA has the lead responsibility for developing and implementing community involvement activities at the Site. EPA developed a Community Involvement Plan (CIP) in 2003 for the Site and updated the CIP again in 2013. Pursuant to 40 C.F.R. § 300.435(c), EPA shall review the existing CIP and determine whether it should be revised to describe further public involvement activities during the Work that are not already addressed or provided for in the existing CIP. Butte Citizens Technical Environmental Committee (CTEC) has been funded by a Technical Assistance Grant since the late 1980s and its continuing role will be addressed in any revised CIP.
- (b) If requested by EPA, SDs, and DEQ for DEQ-designated work only, shall participate in community involvement activities, including participation in (1) the preparation of information regarding the Work for dissemination to the public, with consideration given to including mass media and/or internet notification, and (2) public meetings that may be held or sponsored by EPA to explain activities at or relating to the Site. SDs' support of EPA's community involvement activities may also include providing online access to initial submissions and updates of deliverables to:
  - (1) Any Community Advisory Groups,
  - (2) Any Technical Assistance Grant recipients and their advisors, and
  - (3) Other entities named by EPA to provide them with a reasonable opportunity for review and comment. EPA may describe in its CIP SDs' responsibilities for community involvement activities. All community involvement activities conducted by SDs at EPA's request are subject to EPA's oversight. EPA previously provided on-site administrative records for the 2006 ROD and the 2011 ESD. EPA shall maintain an on-site administrative record for the 2020 Record of Decision Amendment at the local document repository designated for that administrative record, which is Montana Tech Library, 1300 W. Park Street, Butte MT 59701. That repository shall also house the ongoing record of documents generated under this BPSOU SOW, and all deliverables required under this BPSOU SOW shall be copied to this address. The SDs, and DEQ for DEQ-designated Work only, shall also send a copy of any document or record generated under this BPSOU SOW to the CTEC offices in Butte, P.O. Box 593, Butte, MT 59703.
- (c) **SDs' Community Involvement Coordinator.** If requested by EPA, SDs shall, within 30 days of a request, designate and notify EPA of SDs' Community Involvement Coordinator (SDs' CI Coordinator). SDs may hire a contractor for this purpose. SDs' notice must include the name, title, and qualifications of the SDs' CI Coordinator. SDs' CI Coordinator is responsible for providing support regarding EPA's community involvement activities, including coordinating with EPA's CI Coordinator regarding responses to the public's inquiries to EPA about the BPSOU.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

### **3.0 REMEDIAL DESIGN**

#### **3.1 RD Work Plans**

The obligations described in Section 3.0 apply to work elements described in Section 1.6 (a) through (f) and (i) above. Remedial design obligations and deliverables for work elements described in Section 1.6 (g) and (h) are described in Attachment C, Sections 7 and 8. Remedial design obligations and deliverables for work elements described in Section 1.5 above are described in Attachment B.1.

- (a) SDs shall submit Remedial Design (RD) Work Plans (RDWPs) for EPA approval, in consultation with DEQ for each of the remedial elements listed in Section 1.6 (a) through (f) and (i). Each of the remedial elements listed in Section 1.6 are included in Attachment C of this BPSOU SOW. The RDWPs must include: Plans for implementing all RD activities identified in this BPSOU SOW, and Attachment C, or required by EPA, in consultation with DEQ, to be conducted to develop the RD;
- (b) A description of the overall management strategy for performing the RD, including a proposal for phasing of design and construction, if applicable;
- (c) A description of the proposed general approach to contracting, construction, operation, maintenance, and monitoring of the Remedial Action (RA) as necessary to implement the Work;
- (d) A description of the responsibility and authority of all organizations and key personnel involved with the development of the RD;
- (e) Descriptions of any areas requiring clarification and/or anticipated problems (e.g., data gaps);
- (f) Description of any proposed pre-design investigation;
- (g) Description of any proposed treatability study (if required);
- (h) Descriptions of any applicable permitting requirements and other regulatory requirements;
- (i) Description of plans for obtaining access in connection with the Work, such as property acquisition, property leases, and/or easements; and
- (j) Appropriate reference to the following supporting deliverables described in ¶ 6.7 (Supporting Deliverables): Site-Wide Health and Safety Plan; Site-Wide Emergency Response Plan; and Site-Wide Quality Assurance Project Plans.

#### **3.2 Periodic Meetings**

During the RD process, SDs shall meet regularly with EPA and DEQ to discuss design issues as necessary, as directed or determined by EPA, in consultation with DEQ.

#### **3.3 Pre-Design Investigations**

The purpose of the Pre-Design Investigation (PDI) is to address data gaps by conducting additional field investigations. Several investigations are identified in Attachment C and will be identified in the RDWPs, and it is anticipated that additional data gaps may be identified during design that require investigation. The following presents general requirements for pre-design investigations.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- (a) **PDI Work Plan.** SDs shall submit a PDI Work Plan (PDIWP) for EPA approval, in consultation with DEQ. The PDIWP must include:
  - (1) An evaluation and summary of existing data and description of data gaps;
  - (2) A sampling plan including media to be sampled, contaminants or parameters for which sampling will be conducted, location (areal extent and depths), and number of samples; and
  - (3) Cross references to quality assurance/quality control (QA/QC) requirements set forth in the Quality Assurance Project Plan (QAPP) and as described in Section X (Quality Assurance, Sampling and Data Analysis) of the Consent Decree.
- (b) Following the PDI, SDs shall submit a PDI Evaluation Report, for EPA approval, in consultation with DEQ. This report must include:
  - (1) Summary of the investigations performed;
  - (2) Summary of investigation results;
  - (3) Summary of validated data (i.e., tables and graphics);
  - (4) Data validation reports and laboratory data reports;
  - (5) Narrative interpretation of data and results;
  - (6) Results of statistical and modeling analyses, if completed;
  - (7) Photographs documenting the work conducted, if required or voluntarily obtained; and
  - (8) Conclusions and recommendations for RD, including design parameters and criteria.
- (c) EPA, in consultation with DEQ, may require SDs to supplement the PDI Evaluation Report and/or to perform additional pre-design studies.

**3.4 Preliminary (30%) RDs**

SDs shall submit a Preliminary (30%) RD for EPA's comment, in consultation with DEQ. The Preliminary RD must include:

- (a) A design criteria report, as described in the *Remedial Design/Remedial Action Handbook*, EPA 540/R-95/059 (June 1995);
- (b) Preliminary drawings;
- (c) Descriptions of permit requirements, if applicable;
- (d) Any proposed revisions to the RA Schedule that is set forth in ¶ 7.3 (RA Schedule); and
- (e) Updates of all supporting deliverables required to accompany the RDWP.

**3.5 Intermediate (60%) RDs**

SDs shall submit the Intermediate (60%) RD for EPA's comment, in consultation DEQ. The Intermediate RD must:

- (a) Be a continuation and expansion of the Preliminary RD;
- (b) Address EPA's comments regarding the Preliminary RD; and
- (c) Include specifications (as available) and the same elements as are required for the Preliminary (30%) RD.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**3.6 Pre-Final (95%) RDs.**

SDs shall submit the Pre-final (95%) RD for EPA's comment, in consultation with DEQ. The Pre-final RD must be a continuation and expansion of the previous design submittal and must address EPA's comments regarding the Intermediate RD. The Pre-final RD will serve as the approved Final (100%) RD if EPA approves the Pre-final RD without comments. The Pre-final RD must include:

- (a) A complete set of construction drawings and specifications that are:
  - (1) Certified by a registered professional engineer;
  - (2) Suitable for procurement; and
  - (3) Follow the most current edition of the Construction Specifications Institute's Master Format;
- (b) A survey and engineering drawings showing existing Site features, such as elements, property borders, easements, and Site conditions;
- (c) Pre-Final versions of the same elements and deliverables as are required for the Preliminary/Intermediate RD;
- (d) A specification for photographic documentation of the RA;
- (e) Preliminary Operation and Maintenance (O&M) Plan and O&M Manual;
- (f) A description of how the RA will be implemented in a manner that minimizes environmental impacts in accordance with EPA's *Principles for Greener Cleanups* (Aug. 2009);
- (g) A description of monitoring and control measures to protect human health and the environment, such as air monitoring and dust suppression, during the RA;
- (h) Any proposed revisions to the RA Schedule that is set forth in ¶ 7.3 (RA Schedule); and
- (i) Updates of all supporting deliverables required to accompany the Preliminary (30%) RD.

**3.7 Final (100%) RDs**

SDs shall submit the Final (100%) RD for EPA approval, in consultation with DEQ. The Final RD must address EPA comments on the Pre-final RD and must include final versions of all Pre-final RD deliverables.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

#### **4.0 REMEDIAL ACTION**

##### **4.1 RA Work Plans**

The obligations described in Section 4.0 apply to work elements described in Section 1.6 (a) through (f) and (i) above. Remedial Action obligations and deliverables for work elements described in Section 1.6 (g) and (h) are described in Attachment C, Sections 7 and 8. Remedial Action obligations and deliverables for work elements described in Section 1.5 above are described in Attachment B.1.

- (a) SDs shall submit a RA Work Plan (RAWP) for EPA approval that includes:
- (1) A proposed RA Construction Schedule that integrates and sequences construction of work elements described in Section 1.6 above, and presents construction milestone dates in a Gantt chart format;
  - (2) If necessary, an updated health and safety plan that covers activities during the RA; and
  - (3) Plans for satisfying any permitting requirements, including obtaining permits for off-site activity, and for satisfying the substantive requirements of permits for on-site activity.

##### **4.2 Implementation and Construction of Work Elements Included in the Remedial Designs**

SDs shall perform and implement all work included in the approved Final (100%) Remedial Designs and as described in the RA Work Plans.

##### **4.3 Meetings and Inspections**

- (a) **Preconstruction Conference.** Before performing any Work required of the SDs in Attachment C, SDs shall hold a preconstruction conference with EPA and others as directed or approved by EPA, in consultation with DEQ and as described in the Remedial Design/Remedial Action Handbook, EPA 540/R-95/059 (June 1995). SDs shall prepare an agenda and minutes of the conference and shall distribute an agenda prior to the conference and the minutes after the conference to all Parties.
- (b) **Periodic Meetings.** During the construction portion of the RA (RA Construction), SDs shall meet weekly with EPA and DEQ, and others as directed or determined by EPA, to discuss construction issues. Modifications to Work activities may be documented through a Request for Change (RFC) submitted and signed by SDs and approved by the EPA's project representatives, done in consultation with DEQ, and notations in the daily log. SDs shall distribute an agenda and list of attendees to all Parties prior to each meeting. SDs shall prepare minutes of the meetings and shall distribute the minutes to all Parties.
- (c) **Inspections**
- (1) EPA or its contractor shall conduct periodic inspections of the Work. At EPA's request, the Supervising Contractor or other designee shall accompany EPA or its contractor during inspections.
  - (2) If needed: SDs shall provide office space in the form of an available desk for EPA personnel to perform their oversight duties.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- (3) If needed: SDs shall provide personal protective equipment needed for EPA personnel and any oversight officials to perform their oversight duties.
- (4) Upon notification by EPA of any deficiencies in the RA Construction, SDs shall take all necessary steps to correct the deficiencies and/or bring the RA Construction into compliance with the approved Final RD, any approved design changes, and/or the approved RAWP. If applicable, SDs shall comply with any schedule provided by EPA in its notice of deficiency.

#### **4.4 Emergency Response and Reporting**

- (a) **Emergency Response and Reporting.** If any event occurs during performance of the Work that causes or threatens to cause a release of Waste Material on, at, or from the Site and that either constitutes an emergency situation or that may present an immediate threat to public health or welfare or the environment, SDs shall:
  - (1) Immediately take all appropriate action to prevent, abate, or minimize such release or threat of release;
  - (2) Immediately notify the authorized EPA officer (as specified in ¶ 4.4(c)) orally; and
  - (3) Take such actions in consultation with the authorized EPA officer and in accordance with all applicable provisions of the applicable Health and Safety Plan, the applicable Emergency Response Plan, and any other deliverable approved by EPA, in consultation with DEQ under the BPSOU SOW.
- (b) **Release Reporting.** Upon the occurrence of any event during performance of the Work that SDs are required to report pursuant to Section 103 of CERCLA, 42 U.S.C. § 9603, or Section 304 of the Emergency Planning and Community Right-to-know Act (EPCRA), 42 U.S.C. § 11004, SDs shall immediately notify the authorized EPA officer orally.
- (c) The “authorized EPA Remedial Project Manager (RPM)” for purposes of immediate oral notifications and consultations under ¶ 4.4(a) and ¶ 4.4(b) is the EPA RPM, the EPA Alternate RPM (if the EPA RPM is unavailable), or the EPA Emergency Response Unit, Region 8 (if neither EPA RPM is available).
- (d) For any event covered by ¶ 4.4(a) and ¶ 4.4(b), SDs shall:
  - (1) Within 14 days after the onset of such event, submit a report to EPA and DEQ describing the actions or events that occurred and the measures taken, and to be taken, in response thereto; and
  - (2) Within 30 days after the conclusion of such event, submit a report to EPA describing all actions taken in response to such event.
- (e) The reporting requirements under ¶ 4.4 are in addition to the reporting required by CERCLA § 103 or EPCRA § 304.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

#### 4.5 Off-Site Shipments

- (a) SDs may ship hazardous substances, pollutants, and contaminants from the Site to an off-Site facility only if they comply with Section 121(d)(3) of CERCLA, 42 U.S.C. § 9621(d)(3), and 40 C.F.R. § 300.440. SDs will be deemed to be in compliance with CERCLA § 121(d)(3) and 40 C.F.R. § 300.440 regarding a shipment if SDs obtain a prior determination from EPA that the proposed receiving facility for such shipment is acceptable under the criteria of 40 C.F.R. § 300.440(b).
- (b) SDs may ship Waste Material from the Site to an out-of-state waste management facility only if, prior to any shipment, they provide notice to the appropriate state environmental official in the receiving facility's state and to the EPA Project Coordinator. This notice requirement will not apply to any off-Site shipments when the total quantity of all such shipments does not exceed 10 cubic yards. The notice must include the following information, if available:
  - (1) The name and location of the receiving facility;
  - (2) The type and quantity of Waste Material to be shipped;
  - (3) The schedule for the shipment; and
  - (4) The method of transportation. SDs also shall notify the state environmental official referenced above and the EPA Project Coordinator of any major changes in the shipment plan, such as a decision to ship the Waste Material to a different out-of-state facility. SDs shall provide the notice after the award of the contract for RA construction and before the Waste Material is shipped.
- (c) SDs may ship Investigation Derived Waste (IDW) from the Site to an off-Site facility only if they comply with Section 121(d)(3) of CERCLA, 42 U.S.C. § 9621(d)(3), 40 C.F.R. § 300.440, *EPA's Guide to Management of Investigation Derived Waste*, OSWER 9345.3-03FS (Jan. 1992), and any IDW-specific requirements contained in the ROD. Wastes shipped off-Site to a laboratory for characterization, and RCRA hazardous wastes that meet the requirements for an exemption from RCRA under 40 CFR § 261.4(e) shipped off-site for treatability studies, are not subject to 40 C.F.R. § 300.440.

#### 4.6 RA Construction Completion.

The obligations and deliverables described in this Section 4.6 are those of the SDs only, and apply when all Remedial Action described in this BPSOU SOW is complete, except as explicitly noted below.

- (a) For purposes of this ¶ 4.6, "RA Construction" comprises, for any RA that involves the construction and operation of a system or a monitoring period to achieve Performance Standards (for example, groundwater or surface water remedies), the construction of such system and the performance of all activities necessary for the system to function properly and as designed.
- (b) **Inspection of Constructed Remedy.** SDs shall schedule an inspection to review the construction and operation of the systems and to review whether the systems are functioning properly and as designed. The inspection must be



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

attended by SDs, DEQ and EPA and/or their representatives. A re-inspection must be conducted if requested by EPA.

- (c) **Shakedown Period.** There shall be shakedown periods for certain Work elements as described in Attachment A to this BPSOU SOW.
- (d) **RA Construction Completion Report (CCR).** Following the shakedown periods, SDs shall submit an “RA CCR” requesting EPA’s determination that RA Construction (excluding on-going RMAP-related activities) has been completed. The RA CCR must:
  - (1) Include statements by a registered professional engineer and by SDs’ Project Coordinator that construction of the system is complete, and that the system is functioning properly and as designed;
  - (2) Include a demonstration, and supporting documentation, that construction of the system is complete, and that the system is functioning properly and as designed;
  - (3) Include as-built drawings signed and stamped by a registered professional engineer;
  - (4) Be prepared in accordance with Chapter 2 (Remedial Action Completion) of EPA’s *Close Out Procedures for NPL Sites* guidance (May 2011), as supplemented by *Guidance for Management of Superfund Remedies in Post Construction*, OLEM 9200.3-105 (Feb. 2017); and
  - (5) Be certified in accordance with ¶ 6.5 (Certification).
- (e) If EPA determines that RA Construction is not complete, EPA shall so notify SDs. EPA’s notice must include a description of, and schedule for, the activities that SDs must perform to complete RA Construction. EPA’s notice may include a schedule for completion of such activities or may require SDs to submit a proposed schedule for EPA approval. SDs shall perform all activities described in the EPA notice in accordance with the schedule, which schedule may be modified by agreement of SDs and EPA, in consultation with DEQ.
- (f) If EPA determines, based on the initial or any subsequent RA CCR, that RA Construction is complete, EPA shall so notify SDs.
- (g) In addition to the RA CCR Report, when RA Construction of all elements identified in Section 1.6 is complete, a key remedial elements construction completion report (KRECCR) shall be prepared by SDs in accordance with Attachment A and submitted to the EPA for review and approval, in consultation with DEQ.
- (h) The Compliance Standard Determination Period will begin after approval of the KRECCR.

#### 4.7 Certification of RA Completion

- (a) **RA Completion Inspection.** The RA is “Complete” for purposes of this ¶ 4.7 when construction of the RA has been fully performed and the Performance Standards (including Replacement Standards identified in Attachment A to this BPSOU SOW) have been attained. For purposes of this Consent Decree, in-stream Performance Standards have been attained when:



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- (1) Performance Standards for in-stream chronic conditions have been attained consistently over a two-year period at any time after approval of the KRECCR; and
  - (2) Performance Standards for in-stream acute conditions either:
    - (i) have been attained consistently during a series of two consecutive spring and summer seasonal periods at any time after approval of the KRECCR; or
    - (ii) have not been attained consistently during a series of two consecutive spring and summer seasonal periods at any time after approval of the KRECCR, but the SDs demonstrate that all BPSOU stormwater control features required under this Consent Decree were functioning as designed and were operated in accordance with all relevant O&M plans during that same period and SDs provide a reasonable basis for attributing, at least in part, the exceedance(s) to one or more sources other than pre-1980 historic mining waste sources within the BPSOU.
  - (3) SDs shall schedule an inspection for the purpose of obtaining EPA's Certification of RA Completion. The inspection must be attended by SDs and EPA and/or their representatives.
- (b) **RA Completion Report.** Following the inspection and/or following the Compliance Standard Determination Period and EPA's Compliance Determination, as those terms are defined in described in Attachment A, SDs shall submit an RA Completion Report to EPA requesting EPA's Certification of RA Completion. The report must:
- (1) Include certifications by a registered professional engineer and by SD's Project Coordinator that the RA is complete;
  - (2) Be prepared in accordance with Chapter 2 (Remedial Action Completion) of EPA's *Close Out Procedures for NPL Sites* guidance (May 2011), as supplemented by *Guidance for Management of Superfund Remedies in Post Construction*, OLEM 9200.3-105 (Feb. 2017);
  - (3) Contain monitoring data to document post-RA surface water quality; and
  - (4) Be certified in accordance with ¶ 6.5 (Certification).
- (c) If EPA concludes that the RA is not Complete or remedial goals have not been obtained, except acute in-stream surface water quality Performance Standards as provided in ¶ 4.7(a) above, EPA shall so notify SDs. EPA's notice must include a description of any deficiencies. EPA's notice may include a schedule for addressing such deficiencies or may require SDs to submit a schedule for EPA, in consultation with DEQ approval. SDs shall perform such activities that are described in the notice in accordance with the schedule, which schedule may be modified by agreement of SDs and EPA, in consultation with DEQ.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- (d) If EPA, in consultation with DEQ concludes, based on the initial or any subsequent Monitoring Report requesting Certification of RA Completion, that the RA is Complete, EPA shall so certify to SDs. This certification will constitute the Certification of RA Completion for purposes of the CD, including Section XVII of the CD (Covenants and Reservations by the U.S. and the State). Certification of RA Completion will not affect SDs' remaining obligations under the CD.

#### 4.8 Periodic Review Support Plan (PRSP)

SDs shall submit the PRSP for EPA approval, in consultation with DEQ, upon request by EPA. The PRSP addresses the studies and investigations that SDs shall conduct to support EPA's reviews of whether the RA is protective of human health and the environment in accordance with Section 121(c) of CERCLA, 42 U.S.C. § 9621(c) (also known as "Five-year Reviews"). SDs shall develop the plan in accordance with *Comprehensive Five-year Review Guidance*, OSWER 9355.7-03B-P (June 2001), and any other relevant five-year review guidances.

#### 4.9 Certification of Work Completion

- (a) **Work Completion Inspection.** Upon completion of all Work, SDs shall schedule an inspection for the purpose of obtaining EPA's Certification of Work Completion. The inspection must be attended by SDs and EPA and/or their representatives.
- (b) **Work Completion Report.** Following the inspection, SDs shall submit a report to EPA requesting EPA's Certification of Work Completion. The report must:
  - (1) Include certifications by a registered professional engineer and by SDs' Project Coordinator that the Work, including all O&M activities, is complete; and
  - (2) Be certified in accordance with ¶ 6.5 (Certification). If the Monitoring Report submitted under ¶ 4.7(b) includes all elements required under this ¶ 4.9(b), then the Monitoring Report suffices to satisfy all requirements under this ¶ 4.9(b).
- (c) If EPA concludes that the Work is not complete, EPA shall so notify SDs. EPA's notice must include a description of the activities that SDs must perform to complete the Work. EPA's notice must include specifications and a schedule for such activities or must require SDs to submit specifications and a schedule for EPA approval. SDs shall perform all activities described in the notice or in the EPA-approved specifications and schedule, which schedule may be modified by agreement of SDs and EPA, in consultation with DEQ.
- (d) If EPA concludes, based on the initial or any subsequent report requesting Certification of Work Completion, that the Work is complete, EPA shall so certify in writing to SDs. Issuance of the Certification of Work Completion does not affect the following continuing obligations:



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- (1) Activities under the Periodic Review Support Plan;
- (2) Obligations under Sections XI (Access and Institutional Controls, XXI (Retention of Records), and XX (Access to Information) of the CD;
- (3) Institutional Controls obligations as provided in the Institutional Control Implementation and Assurance Plan; and
- (4) Reimbursement of EPA's Future Response Costs under Section VI (Payment of Response Costs) of the CD.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**5.0 REPORTING**

**5.1 Progress Reports**

Commencing with the month following lodging of the CD and until EPA approves the RA Construction Completion, SDs shall submit progress reports to EPA on a monthly basis, or as otherwise requested by EPA. The reports must cover all activities that took place during the prior reporting period, including:

- (a) The actions that have been taken toward achieving compliance with the CD;
- (b) A summary of all results of sampling, tests, and all other data received or generated by SDs;
- (c) A description of all deliverables that SDs submitted to EPA;
- (d) A description of all activities relating to RA Construction that are scheduled for the next six weeks;
- (e) An updated RA Construction Schedule, together with information regarding percentage of completion, delays encountered or anticipated that may affect the future schedule for implementation of the Work, and a description of efforts made to mitigate those delays or anticipated delays;
- (f) A description of any modifications to the work plans or other schedules that SDs have proposed or that have been approved by EPA; and
- (g) A description of all activities undertaken in support of the CIP during the reporting period and those to be undertaken in the next six weeks.

**5.2 Notice of Progress Report Schedule Changes.**

If the schedule for any activity described in the Progress Reports, including activities required to be described under ¶ 5.1(d), changes, SDs shall notify EPA of such change at least 4 days before performance of the activity, unless emergency or force majeure conditions make such a notice infeasible.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **6.0 DELIVERABLES**

### **6.1 Applicability**

SDs shall submit deliverables for EPA approval or for EPA comment, in consultation with DEQ, as specified in this BPSOU SOW. If neither is specified, the deliverable does not require EPA's approval or comment. Paragraphs 6.2 (In Writing) through 6.4 (Technical Specifications) apply to all deliverables. Paragraph 6.5 (Certification) applies to the deliverables described in Paragraphs 4.6, 4.7 and 4.9. Paragraph 6.6 (Approval of Deliverables) applies to any deliverable that is required to be submitted for EPA approval.

### **6.2 In Writing**

As provided in Paragraph 115 of the CD, all deliverables under this BPSOU SOW must be in writing unless otherwise specified.

### **6.3 General Requirements for Deliverables**

All deliverables must be submitted by the deadlines in the RD Schedule or RA Schedule, as applicable. SDs shall submit all deliverables to EPA in electronic form to the EPA and DEQ contacts listed in Paragraph 115 of the CD. Technical specifications for sampling and monitoring data and spatial data are addressed in ¶ 6.4. All other deliverables shall be submitted to EPA in the electronic form specified by the EPA RPM. If any deliverable includes maps, drawings, or other exhibits that are larger than 11.5" by 17" SDs shall also provide EPA with paper copies of such exhibits.

### **6.4 Technical Specifications**

- (a) Sampling and monitoring data should be submitted in the most recent or the current at the time of generation standard U.S. EPA Region 8 Electronic Data Deliverable (EDD) format. Other delivery methods may be allowed if electronic direct submission presents a significant burden or as technology changes.
- (b) Spatial data, including spatially-referenced data and geospatial data, should be submitted:
  - (1) In the ESRI File Geodatabase format; and
  - (2) As unprojected geographic coordinates in decimal degree format using North American Datum 1983 (NAD83) or World Geodetic System 1984 (WGS84) as the datum. If applicable, submissions should include the collection method(s). Projected coordinates may optionally be included but must be documented. Spatial data should be accompanied by metadata, and such metadata should be compliant with the Federal Geographic Data Committee (FGDC) Content Standard for Digital Geospatial Metadata and its EPA profile, the EPA Geospatial Metadata Technical Specification. An add-on metadata editor for ESRI software, the EPA Metadata Editor (EME), complies with these FGDC and EPA metadata requirements and is available at <https://www.epa.gov/geospatial/epa-metadata-editor>.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- (c) Each file must include an attribute name for each site unit or sub-unit submitted. Consult <https://www.epa.gov/geospatial/geospatial-policies-and-standards> for any further available guidance on attribute identification and naming.
- (d) Spatial data submitted by SDs does not, and is not intended to, define the boundaries of the Site.

## 6.5 Certification

All deliverables that require compliance with this ¶ 6.5 (i.e., that must be Certified) must be signed by the SDs' Project Coordinator, or other responsible official of SDs, and must contain the following statement:

I certify under penalty of law that this document and all attachments were prepared in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or who are directly responsible for authoring the relevant document, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate and complete. I am aware that there are significant penalties for submitting false information.

## 6.6 Approval of Deliverables

- (a) Initial Submissions
  - (1) After review of any deliverable that is required to be submitted for EPA approval under the CD or the BPSOU SOW, EPA shall:
    - (i) Approve, in whole or in part, the submission;
    - (ii) Approve the submission upon specified conditions;
    - (iii) Disapprove, in whole or in part, the submission; or
    - (iv) Any combination of the foregoing.
  - (2) EPA also may modify the initial submission to cure deficiencies in the submission if:
    - (i) EPA determines that disapproving the submission and awaiting a resubmission would cause substantial disruption to the Work; or
    - (ii) Previous submission(s) have been disapproved due to material defects and the deficiencies in the initial submission under consideration indicate a bad faith lack of effort to submit an acceptable deliverable.
- (b) **Resubmissions.** Upon receipt of a notice of disapproval under ¶ 6.6(a) (Initial Submissions), or if required by a notice of approval upon specified conditions under ¶ 6.6(a), SDs shall, within 30 days or such longer time as specified by EPA in such notice, correct the deficiencies and resubmit the deliverable for approval. After review of the resubmitted deliverable, EPA may:
  - (1) Approve, in whole or in part, the resubmission;
  - (2) Approve the resubmission upon specified conditions;



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- (3) Modify the resubmission;
  - (4) Disapprove, in whole or in part, the resubmission, requiring SDs to correct the deficiencies; or
  - (5) Any combination of the foregoing.
- (c) **Implementation.** Upon approval, approval upon conditions, or modification by EPA under ¶ 6.6(a) (Initial Submissions) or ¶ 6.6(b) (Resubmissions), of any deliverable, or any portion thereof:
- (1) Such deliverable, or portion thereof, will be incorporated into and enforceable under the CD; and
  - (2) SDs shall take any action required by such deliverable, or portion thereof. The implementation of any non-deficient portion of a deliverable submitted or resubmitted under ¶ 6.6(a) or ¶ 6.6(b) does not relieve SDs of any liability for stipulated penalties under Section XVI (Stipulated Penalties) of the CD.

## 6.7 Supporting Deliverables

SDs shall submit each of the following supporting deliverables for EPA, in consultation with DEQ approval, except as specifically provided. SDs shall develop the deliverables in accordance with all applicable regulations, guidances, and policies (see Section 9.0 (References)). SDs shall update each of these supporting deliverables as necessary or appropriate during the course of the Work, and/or as requested by EPA.

- (a) **Updated Site-Specific Health and Safety Plan.** The Health and Safety Plan (HASP) describes all activities to be performed to protect on site personnel and area residents from physical, chemical, and all other hazards posed by the Work. SDs have developed and the agencies accept the BPSOU Site-wide HASP as conforming with EPA's Emergency Responder Health and Safety and Occupational Safety and Health Administration (OSHA) requirements under 29 C.F.R. §§ 1910 and 1926. The HASP covers RD activities and shall be, as appropriate, updated to cover activities during the RA and updated to cover activities after RA completion. EPA does **not** approve the HASP, but will review it to ensure that all necessary elements are included and that the plan provides for the protection of human health and the environment.
- (b) **Site-Specific Emergency Response Plan.** The Emergency Response Plan (ERP) must describe procedures to be used in the event of an accident or emergency at the Site (for example, power outages, water impoundment failure, treatment plant failure, slope failure, etc.). The HASP includes an ERP that generally covers BPSOU. SDs contractors shall prepare an ERP specific to the project area in which each performs work activities. The ERP must include:
  - (1) Name of the person or entity responsible for responding in the event of an emergency incident;
  - (2) Plan and date(s) for meeting(s) with the local community, including local, State, and federal agencies involved in the cleanup, as well as local emergency squads and hospitals;



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- (3) Spill Prevention, Control, and Countermeasures (SPCC) Plan (if applicable), consistent with the regulations under 40 C.F.R. Part 112, describing measures to prevent, and contingency plans for, spills and discharges;
  - (4) Notification activities in accordance with ¶ 4.4(b) (Release Reporting) in the event of a release of hazardous substances requiring reporting under Section 103 of CERCLA, 42 U.S.C. § 9603, or Section 304 of the Emergency Planning and Community Right-to-know Act (EPCRA), 42 U.S.C. § 11004; and
  - (5) A description of all necessary actions to ensure compliance with Paragraph 25 (Emergencies and Releases for Settling Defendants) of the CD in the event of an occurrence during the performance of the Work that causes or threatens a release of Waste Material from the Site that constitutes an emergency or may present an immediate threat to public health or welfare or the environment.
- (c) **Site-Wide Construction Quality Assurance/Construction Quality Control (CQA/CQC) Plans.** The purpose of the Construction Quality Assurance (CQA) Plan is to describe planned and systemic activities that provide confidence that the RA construction will satisfy all plans, specifications, and related requirements, including quality objectives. The purpose of the Construction Quality Control (CQC) Plan is to describe the activities to verify that RA construction has satisfied all plans, specifications, and related requirements, including quality objectives. The CQA/CQC Plans prepared for each of the work elements described in Section 1.6 above must:
- (1) Identify, and describe the responsibilities of, the organizations and personnel implementing the CQA/CQC Plans;
  - (2) Describe the Performance Standard (PS) required to be met to achieve Completion of the RA;
  - (3) Describe the activities to be performed:
    - (i) To provide confidence that PS will be met; and
    - (ii) To determine whether PS have been met;
  - (4) Describe verification activities, such as inspections, sampling, testing, monitoring, and production controls, under the CQA/CQC Plans;
  - (5) Describe industry standards and technical specifications used in implementing the CQA/CQC Plans;
  - (6) Describe procedures for tracking construction deficiencies from identification through corrective action;
  - (7) Describe procedures for documenting all CQA/CQC activities; and
  - (8) Describe procedures for retention of documents and for final storage of documents.
- (d) **Submittal Tracking Database.** A submittal tracking database shall be used as a tracking system for all deliverables required under this BPSOU SOW.
- (e) **Quality Management Plan.** A quality management plan (QMP) was approved by EPA in consultation with DEQ on June 1, 2018. The QMP describes the quality system in terms of organizational structure, functional



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

responsibilities of management and staff, lines of authority, and required interfaces for those planning, implementing, and assessing all activities conducted by the SDs. The quality system provides the framework for planning, implementing, documenting, and assessing work performed by the SDs and for carrying out required QA and QC activities. The QMP will be updated and revised on an annual basis and submitted to EPA for review and approval by EPA in consultation with DEQ.

- (f) **Data Management Plan.** A data management plan (DMP) was approved by EPA in consultation with DEQ on June 28, 2018. The data management plan shall identify and document the requirements and responsibilities for managing and using data and information generated from O&M or OMM activities (e.g., environmental data, submittal tracking). The DMP will be updated and revised on an annual basis and submitted to EPA for reviewed and approval by EPA in consultation with DEQ.
- (g) **O&M Plan(s).** The O&M Plans listed in Section 1.5 above, listed in Attachment B.1. and for each remedial element or group of remedial elements, except those described in Section 1.6(g) and (h) which are addressed in the BRES O&M Plan, are required. The O&M Plans shall describe the requirements for inspecting, operating, and maintaining the RA. SDs shall develop the O&M Plans in accordance with *Guidance for Management of Superfund Remedies in Post Construction*, OLEM 9200.3-105 (Feb. 2017). The O&M Plan must also include the following additional requirements:
  - (1) Description of PS required to be met to satisfy the ROD;
  - (2) Description of activities to be performed:
    - (i) to provide confidence that PS will be met; and
    - (ii) to determine whether PS have been met;
  - (3) O&M Reporting. Description of records and reports that will be generated during O&M, such as daily operating logs, laboratory records, records of operating costs, reports regarding emergencies, personnel and maintenance records, monitoring reports, and monthly and annual reports to EPA and State agencies;
  - (4) Description of corrective action in case of systems failure, including:
    - (i) Alternative procedures to prevent the release or threatened release of Waste Material which may endanger public health and the environment or may cause a failure to achieve PS;
    - (ii) Analysis of vulnerability and additional resource requirements should a failure occur;
    - (iii) Notification and reporting requirements should O&M systems fail or be in danger of imminent failure; and
    - (iv) Community notification requirements; and
  - (5) Description of corrective action to be implemented in the event that PS are not achieved; and a schedule for implementing these corrective actions.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- (h) **O&M Manual.** The O&M Manual shall be developed if needed, as determined by EPA in consultation with DEQ. The O&M Manual serves as a guide to the purpose and function of the equipment and systems that make up the remedy. SDs shall develop the O&M Manual in accordance with *Guidance for Management of Superfund Remedies in Post Construction*, OLEM 9200.3-105 (Feb. 2017).
- (i) **Wetlands ARAR Compliance Report.** At the time the KRECCR is submitted, the SDs shall also submit this report. The Wetlands ARAR Compliance Report shall describe compliance with the no-net loss of wetlands requirement, using the four-step methodology previously approved by EPA. See *Summary of Four-Step Process, Addressing Wetlands Issues in Upper Clark Fork River. Superfund Sites, Letter from Ms. Sandra Stash, ARCO, Anaconda, MT to Mr. Donald Pizzini and Mr. Robert Fox, USEPA, Helena, MT. January 27, 1992.*
- (j) **Historical Preservation Act Compliance Report.** At the time the KRECCR is submitted, the SDs shall also submit this report. The Historical Preservation Act Compliance Report shall describe compliance with this ARAR by listing identified eligible or protected historical resources within the BPSOU and the efforts to either avoid or mitigate any adverse impacts to those resources. The report may reference the list of eligible or protected historical resources identified in Section 5.7 of the 2006 ROD, and may also reference the 1<sup>st</sup> and 2<sup>nd</sup> Programmatic Agreements including the attachments to the 2<sup>nd</sup> Programmatic Agreement, which describe efforts to avoid or mitigate adverse impacts to these resources, and the status of the implementation of these efforts.
- (k) **Institutional Controls Implementation and Assurance Plan.** The Institutional Controls Implementation and Assurance Plan (ICIAP) describes plans to implement, maintain, and enforce the Institutional Controls (ICs) at the Site. This plan has been approved and is attached to the CD as Appendix E.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**7.0 SCHEDULES**

**7.1 Applicability and Revisions**

All deliverables and tasks required under this BPSOU SOW must be submitted or completed by the deadlines or within the time durations listed in the RD and RA Schedules for the Further Remedial Elements set forth below. SDs may submit proposed revised RD Schedules or RA Schedules for EPA approval. Upon EPA's approval, the revised RD and/or RA Schedules supersede the RD and RA Schedules set forth below, and any previously-approved RD and/or RA Schedules.

**7.2 RD and RA Schedules**

RD and RA Schedules for the Further Remedial Elements is shown as Exhibit 1 to this document.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**8.0 STATE PARTICIPATION**

**8.1 Copies**

SDs shall, at any time they send a deliverable to EPA, send a copy of such deliverable to DEQ and the Montana Natural Resource Damage Program. EPA shall, at any time it sends a notice, authorization, approval, disapproval, or certification to SDs, send a copy of such document to DEQ and the Montana Natural Resource Damage Program.

**8.2 Review and Comment**

For SD submittals and deliverables, DEQ will have a reasonable opportunity for review and comment prior to:

- (a) Any EPA approval or disapproval under ¶ 6.6 (Approval of Deliverables) of any deliverables that are required to be submitted for EPA approval; and
- (b) Any approval or disapproval of the Construction Phase under ¶ 4.6 (RA Construction Completion), any disapproval of, or Certification of RA Completion under ¶ 4.7 (Certification of RA Completion), and any disapproval of, or Certification of Work Completion under ¶ 4.9 (Certification of Work Completion).



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## 9.0 REFERENCES

### 9.1 Regulations and Guidance Documents.

The following regulations and guidance documents, among others, apply to the Work. Any item for which a specific URL is not provided below is available on one of the two EPA Web pages listed in ¶ 9.2:

- (a) A Compendium of Superfund Field Operations Methods, OSWER 9355.0-14, EPA/540/P-87/001a (Aug. 1987).
- (b) CERCLA Compliance with Other Laws Manual, Part I: Interim Final, OSWER 9234.1-01, EPA/540/G-89/006 (Aug. 1988).
- (c) CERCLA Compliance with Other Laws Manual, Part II, OSWER 9234.1-02, EPA/540/G-89/009 (Aug. 1989).
- (d) Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties, OSWER 9355.5-01, EPA/540/G-90/001 (Apr. 1990).
- (e) Guidance on Expediting Remedial Design and Remedial Actions, OSWER 9355.5-02, EPA/540/G-90/006 (Aug. 1990).
- (f) Guide to Management of Investigation-Derived Wastes, OSWER 9345.3-03FS (Jan. 1992).
- (g) Permits and Permit Equivalency Processes for CERCLA On-Site Response Actions, OSWER 9355.7-03 (Feb. 1992).
- (h) Guidance for Conducting Treatability Studies under CERCLA, OSWER 9380.3-10, EPA/540/R-92/071A (Nov. 1992).
- (i) National Oil and Hazardous Substances Pollution Contingency Plan; Final Rule, 40 C.F.R. Part 300 (Oct. 1994).
- (j) Guidance for Scoping the Remedial Design, OSWER 9355.0-43, EPA/540/R-95/025 (Mar. 1995).
- (k) Remedial Design/Remedial Action Handbook, OSWER 9355.0-04B, EPA/540/R-95/059 (June 1995).
- (l) EPA Guidance for Data Quality Assessment, Practical Methods for Data Analysis, QA/G-9, EPA/600/R-96/084 (July 2000).
- (m) Comprehensive Five-year Review Guidance, OSWER 9355.7-03B-P, 540-R-01-007 (June 2001).
- (n) Guidance for Quality Assurance Project Plans, QA/G-5, EPA/240/R-02/009 (Dec. 2002).
- (o) Institutional Controls: Third Party Beneficiary Rights in Proprietary Controls (Apr. 2004).
- (p) Quality management systems for environmental information and technology programs -- Requirements with guidance for use, ASQ/ANSI E4:2014 (American Society for Quality, February 2014).
- (q) Uniform Federal Policy for Quality Assurance Project Plans, Parts 1-3, EPA/505/B-04/900A through 900C (Mar. 2005).
- (r) Superfund Community Involvement Handbook, SEMS 100000070 (January 2016), <https://www.epa.gov/superfund/community-involvement-tools-and-resources>.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- (s) EPA Guidance on Systematic Planning Using the Data Quality Objectives Process, QA/G-4, EPA/240/B-06/001 (Feb. 2006).
- (t) EPA Requirements for Quality Assurance Project Plans, QA/R-5, EPA/240/B-01/003 (Mar. 2001, reissued May 2006).
- (u) EPA Requirements for Quality Management Plans, QA/R-2, EPA/240/B-01/002 (Mar. 2001, reissued May 2006).
- (v) EPA National Geospatial Data Policy, CIO Policy Transmittal 05-002 (Aug. 2008), <https://www.epa.gov/geospatial/geospatial-policies-and-standards> and <https://www.epa.gov/geospatial/epa-national-geospatial-data-policy>.
- (w) Summary of Key Existing EPA CERCLA Policies for Groundwater Restoration, OSWER 9283.1-33 (June 2009).
- (x) Principles for Greener Cleanups (Aug. 2009), <https://www.epa.gov/greenercleanups/epa-principles-greener-cleanups>.
- (y) Close Out Procedures for National Priorities List Sites, OSWER 9320.2-22 (May 2011).
- (z) Groundwater Road Map: Recommended Process for Restoring Contaminated Groundwater at Superfund Sites, OSWER 9283.1-34 (July 2011).
- (aa) Recommended Evaluation of Institutional Controls: Supplement to the “Comprehensive Five-Year Review Guidance,” OSWER 9355.7-18 (Sep. 2011).
- (bb) Construction Specifications Institute’s Master Format, available from <https://www.csiresources.org/home>.
- (cc) Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites, OSWER 9355.0-89, EPA/540/R-09/001 (Dec. 2012).
- (dd) Institutional Controls: A Guide to Preparing Institutional Controls Implementation and Assurance Plans at Contaminated Sites, OSWER 9200.0-77, EPA/540/R-09/02 (Dec. 2012).
- (ee) EPA’s Emergency Responder Health and Safety Manual, OSWER 9285.3-12 (July 2005 and updates), [https://www.epaosc.org/\\_HealthSafetyManual/manual-index.htm](https://www.epaosc.org/_HealthSafetyManual/manual-index.htm).
- (ff) Broader Application of Remedial Design and Remedial Action Pilot Project Lessons Learned, OSWER 9200.2-129 (Feb. 2013).
- (gg) Groundwater Remedy Completion Strategy: Moving Forward with the End in Mind, OSWER 9200.2-144 (May 2014).
- (hh) Guidance for Management of Superfund Remedies in Post Construction, OLEM 9200.3-105 (Feb. 2017), <https://www.epa.gov/superfund/superfund-post-construction-completion>.

## 9.2 EPA Web Pages

A more complete list may be found on the following EPA Web pages:

- (a) Laws, Policy, and Guidance: <https://www.epa.gov/superfund/superfund-policy-guidance-and-laws>
- (b) Test Methods Collections: <https://www.epa.gov/measurements/collection-methods>



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**9.3 Other Regulations and Guidance**

For any regulation or guidance referenced in the CD or BPSOU SOW, the reference will be read to include any subsequent modification, amendment, or replacement of such regulation or guidance. Such modifications, amendments, or replacements apply to the Work only after SDs receive notification from EPA of the modification, amendment, or replacement.



EXHIBIT 1 TO THE REMEDIAL DESIGN/REMEDIAL ACTION STATEMENT OF WORK (SOW)

Remedial Design (RD)/Remedial Action (RA) Schedule for the Further Remedial Elements











- Notes:**
- 1) All deliverables and tasks required under this SOW must be submitted or completed by the deadlines or within the time durations listed in the RD and RA Schedules set forth below.
- 2) SDs may submit proposed revised RD Schedules or RA Schedules for EPA approval.
- 3) Upon EPA approval, the revised RD and/or RA Schedules supersede the RD and RA Schedules set forth below, and any previously-approved RD and/or RA Schedules.
- 4) The below RD/RA Schedule is reflective of current project understanding and known site and project constraints, including but not limited to:

a) A BPSOU Consent Decree will be lodged with the Court in 2020.

b) Parties will attempt to minimize simultaneous operations within the project areas, on haul roads, and at the selected repository location.

c) No more than (1) project may contribute construction dewatering flow to the Butte Treatment Lagoons at any given time during execution of the work.

d) Further Remedial Element construction will be sequenced so that groundwater hydraulic controls are in place and operational prior to commencement of future work that could be impacted by the presence of contaminated groundwater.
- 5) The below RD/RA Schedule addresses content of Sections 3 through 6 of Appendix D, BPSOU SOW. Items that do not require deliverables in accordance with the SOW, or would be addressed within the general tasks of the below RD/RA Schedule are omitted for clarity.
- 6) The below RD/RA Schedule is intended to be inclusive of all known activities required to complete the identified Further Remedial Elements SOW, including the tasks associated with preliminary design, intermediate design, pre-final design and final design (30%, 60%, 95%, 100%), procurement, construction, shakedown, inspection, certification, monitoring, and reporting activities. A more specific Gantt chart schedule shall be developed during remedial design.

BPSOU SOW Reference		Task Description	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041		
3.1		Remedial Design Work Plans																								
3.3		Pre-Design Investigation																								
3.4-3.7		Remedial Design																								
4.1		Remedial Action Work Plans																								
4.2		Further Remedial Elements Construction																								
4.6 c		Shakedown																								
4.6 d		Remedial Action Construction Completion Reports																								
4.6 g		Key Remedial Elements Construction Completion Report																								
4.6 h		Surface Water Compliance Determination Period																								
4.7		Certification of Remedial Action Completion																								
4.7 b (3)		Begin Long-Term Surface Water Compliance Monitoring Period																								



**BPSOU SURFACE WATER COMPLIANCE  
DETERMINATION PLAN**

**BUTTE PRIORITY SOILS OPERABLE UNIT  
of the  
SILVER BOW CREEK / BUTTE AREA SUPERFUND  
SITE**

**Butte-Silver Bow County, Montana**

**ATTACHMENT A TO APPENDIX D  
TO THE CONSENT DECREE**



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	Background.....	2
<b>2.0</b>	<b>IN-STREAM MONITORING FOR NORMAL FLOW AND WET WEATHER CONDITIONS.....</b>	<b>4</b>
2.1	Definition of Wet Weather Events and Normal Flow Conditions.....	4
2.1.1	Wet Weather Events Flow Regime .....	4
2.1.2	Normal Flow Regime Definition.....	5
2.2	Contaminants of Concern for Compliance Monitoring .....	6
2.3	Sampling Parameters .....	7
2.3.1	In-Stream Surface Water Quality Performance Standards.....	7
2.3.2	Downstream Compliance Stations – SS-06G and SS-07 .....	9
2.3.3	Upstream Compliance Assessment Station – SS-01 .....	10
2.4	Type of Monitoring/Sampling .....	10
2.4.1	Wet-Weather Sampling Protocol and Sampling Frequency .....	10
2.4.2	Normal Flow Sampling Protocol.....	10
<b>3.0</b>	<b>PROCEDURES FOR COMPARISON TO IN-STREAM SURFACE WATER PERFORMANCE STANDARDS .....</b>	<b>11</b>
3.1	Sample Averaging .....	11
3.2	Comparison to Performance Standards .....	12
3.3	Comparison to Upstream .....	12
3.4	Allowable Exceedance Rates.....	12
<b>4.0</b>	<b>COMPLIANCE STANDARD DETERMINATION AND USE OF REPLACEMENT STANDARDS.....</b>	<b>13</b>
<b>5.0</b>	<b>CORRECTION OF REMEDIAL ELEMENTS RELATED TO IN-STREAM SURFACE WATER .....</b>	<b>14</b>
<b>6.0</b>	<b>COMPLIANCE DETERMINATION AND PENALTY APPLICATION FOR IN- STREAM PERFORMANCE STANDARDS .....</b>	<b>15</b>
<b>7.0</b>	<b>ADDITIONAL WORK UNDER PARAGRAPH 27 OF THE CD TO ADDRESS IN-STREAM SURFACE WATER PERFORMANCE STANDARD EXCEEDANCES .....</b>	<b>15</b>
7.1	Diagnostic Response and Additional Work to Address Chronic (Normal Flow) Standard Exceedances .....	16
7.2	Diagnostic Response and Additional Work to Address Acute (Wet Weather) Standard Exceedances .....	18
7.3	Further Waivers .....	21
<b>8.0</b>	<b>BUTTE TREATMENT LAGOONS.....</b>	<b>21</b>
8.1	Remaining Remedial Elements Activities .....	21
8.2	Upset Conditions .....	21



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

8.3	Butte Treatment Lagoon Performance Standards.....	22
8.4	Interim Monitoring Period and Interim Standards Period for Butte Treatment Lagoon (BTL) Systems to be Applied During Any Shakedown Period .....	24
<b>9.0</b>	<b>SWCDP MODIFICATIONS .....</b>	<b>25</b>

## **LIST OF TABLES, FIGURES, AND EXHIBITS**

Table 2-1	In-Stream Surface Water Performance Standards
Table 8-1	Butte Treatment Lagoon Discharge Performance Standards
Figure 1-1	In-stream Surface Water Compliance Timeline
Figure 3-1	Summary of Instream Compliance Determination Process
Figure 7-1	Flowchart for Addressing Surface Water Compliance Exceedances (Acute / Wet Weather flow and Chronic/Normal Flow)
Figure 7-2	Corridor Area
Figure 7-3	Surface Water In-stream ARAR Waiver Process
Exhibit 1	BPSOU Surface Water Management Plan



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## 1.0 INTRODUCTION

This BPSOU Surface Water Compliance Determination Plan (SWCDP or this Plan) identifies the methodology for assessing compliance with the surface water Performance Standards at the Butte Priority Soils Operable Unit (BPSOU) of the Silver Bow Creek/Butte Area Superfund Site. This compliance plan, including its methodology, is site-specific, applying to this operable unit only, and shall not serve as precedent for any actions outside of this operable unit. A companion document, the BPSOU Surface Water Management Plan (BPSOU SWMP or SWMP), describes, among other things, the procedures for obtaining the data to be used in this SWCDP and is attached as Exhibit 1 to this SWCDP.

Surface water monitoring under the BPSOU SWMP shall commence upon U.S. Environmental Protection Agency (EPA) approval, in consultation with Montana Department of Environmental Quality (DEQ), of the BPSOU SWMP.

For in-stream numeric surface water applicable or relevant and appropriate requirements (ARARs), also referred to as in-stream surface water Performance Standards, the surface water compliance determination process described in this plan shall commence following:

- a. Approval of the Key Remedial Elements Construction Completion Report (KRECCR) for these key remaining remedial elements including wet weather Best Management Practices (BMPs); additional source control including capping and cap upgrades; and bed, bank and adjacent floodplain contaminated materials removal actions, as further defined and described in Attachment C to the BPSOU Statement of Work (SOW). The KRECCR shall also address floodplain stabilization and vegetation establishment and cap vegetation establishment for new or upgraded caps; and
- b. A subsequent compliance standard determination monitoring period that begins upon approval of the KRECCR which shall include an operational and functional (O&F) demonstration, and lasts for nine (9) years, or a longer period of time that is needed to observe and sample a wet weather event as defined in Section 2.1.1, not to exceed a total of twelve years. In order to maintain consistency with compliance standard determination timing, the compliance standard determination monitoring period will apply for both normal flow and wet weather in-stream surface water Performance Standards. EPA in consultation with DEQ may approve revision of the SWMP if needed to more accurately monitor in-stream surface water quality based on the results during this period or recommendations contained in five-year reviews.

At the completion of the compliance standard determination monitoring period, a compliance standard determination of the in-stream surface water Performance Standards



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

shall be made by EPA, in consultation with DEQ, as described in Section 4.0 of the SWCDP.

That determination shall be made and applied individually for each individual contaminant of concern (COC) and individually for each flow regime. The Performance Standards identified in that determination shall be applicable during subsequent compliance monitoring. Long term in-stream surface water monitoring shall also be conducted along with compliance monitoring.

The attached in-stream surface water compliance timeline (Figure 1-1) describes the sequencing and milestones for the compliance determination process.

For numeric ARAR standards applied to the Butte Treatment Lagoon (BTL) outflow, compliance with end-of-pipe performance standards described in Section 8.0, Table 8-1 shall be required at the end of the shakedown period for the BTL. The shakedown period is currently in place and shall continue until approval of the KRECCR. A new shakedown period shall be approved by EPA, in consultation with DEQ, if significant expansion or modification (i.e., greater than 25 percent capacity) of the BTL is required after the approval of the KRECCR. During the shakedown periods, the Settling Defendants shall use best efforts to achieve the end-of-pipe Performance Standards described in Section 8.0, Table 8-1 for the BTL.

From the Effective Date until the end of any shakedown period, interim standards protocols described in Section 8.4, subsections A. and B. shall apply to the BTL discharge.

## **1.1 Background**

The 2006 BPSOU Record of Decision, issued by EPA with partial concurrence by the DEQ, identified surface water ARAR Performance Standards for surface water within the operable unit. The 2006 Record of Decision adopted State of Montana (State) surface water quality standards set forth in Circular DEQ-7 (February 2006) for the COCs identified in the 2006 Record of Decision.<sup>1</sup> The 2006 Record of

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<sup>1</sup> The ROD identified these standards for certain surface water areas within the BPSOU, including Silver Bow Creek from its confluence with Blacktail Creek downstream. Subsequently, a State of Montana court decision known as *Silver Bow Creek Headwaters Coalition v. State of Montana*, DV-10-431 (August 17, 2015) declared that the surface area between Texas Avenue in Butte and the confluence of Blacktail and Silver Bow Creek was named “Silver Bow Creek.” In prior Superfund removal and remedial documents and publications, including the 2006 Butte Priority Soils Operable Unit Record of Decision (2006 BPSOU ROD) and 2011 BPSOU Explanation of Significant Differences (ESD), EPA has called this surface area the “Metro Storm Drain.” Due to MDEQ’s involvement



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

Decision surface water standards, measured in total recoverable form (dissolved for aluminum), were identified as ARARs for both point sources affected or created by the BPSOU cleanup and for ambient surface waters. These standards are identified in Appendix A, Section IV.A.1. of the 2006 Record of Decision, which identifies ARARs pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act as amended (CERCLA).

Two of these standards – acute in-stream surface water standards for copper and zinc – were subsequently waived by EPA, with the concurrence of DEQ, pursuant to CERCLA and as described in the Amendment to the Record of Decision dated February 4, 2020, and are replaced by federal water quality criteria identified in the 2006 Record of Decision and the 2020 Amendment to the Record of Decision.

If certain aquatic life in-stream surface water Performance Standards in the ROD are exceeded more than three times during the nine-year compliance standard determination monitoring period as more specifically described in Sections 1.0, 3.0, 4.0 and Figure 7-3, that standard shall be waived and replaced with the applicable Replacement Standard identified in the fifth column of Table 2-1 at the time of the Compliance Standard Determination described in Section 4.0. No further ROD amendments or other decision documents are required for the Replacement Standards to become effective.

This document sets forth the compliance assessment methodology for in-stream surface water Performance Standards for the BPSOU and the compliance assessment methodology for end-of-pipe discharge standards from the BTL. Since ambient water quality criteria (AWQC) identified as in-stream surface water Performance Standards or proposed as Replacement Standards are meant only to protect aquatic life in the water column, a supporting in-stream sediment monitoring methodology is separately set forth in the BPSOU SWMP. The monitoring of in-stream sediments is meant to assist in Five Year Review determinations regarding the protectiveness of the BPSOU Remedy, focusing on sediment concentration trends, benthic macro invertebrate data and other relevant data. Further discussion of sediment-related data is contained in the SWMP.

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in this document's issuance, and where reference to this specific section of Silver Bow Creek is necessary, further geographic descriptions, such as Silver Bow Creek "east" or "above" its confluence with Blacktail Creek is used in order for DEQ to comply with the court's order. Reference to the area as "Silver Bow Creek" or "Silver Bow Creek east of or above its confluence with Blacktail Creek" should not be construed as an admission or determination by any Consent Decree party on any procedural or substantive issue. The United States retains and reserves all its rights and authorities.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

Specific in-stream sediment standards are not included as Performance Standards in the ROD or its amendments.

## **2.0 IN-STREAM MONITORING FOR NORMAL FLOW AND WET WEATHER CONDITIONS**

The 2006 Record of Decision specified that the overall surface water remedial goal is to obtain and maintain the in-stream concentrations of COCs below the numeric surface water performance standards for all flow conditions throughout Grove Gulch Creek, Blacktail Creek and Silver Bow Creek, and to return Silver Bow Creek downstream of its confluence with Blacktail Creek to its beneficial uses for all flow conditions, within and downstream of BPSOU.

The surface water in the watershed contains storm water runoff from a combination of historic mine waste and other nonpoint sources, including urban runoff, residential runoff, agricultural runoff, and runoff from other commercial/industrial sources that are not related to the CERCLA remediation. Therefore, while numeric standards are used as surface water Performance Standards, the presence of other third-party sources is considered when determining Settling Defendants' compliance with in-stream surface water Performance Standards. Given the past and future efforts to identify and remediate sources of historic mining waste, the impact of those sources is expected to decline over time. This document specifies procedures for evaluating compliance under these conditions, as described below.

### **2.1 Definition of Wet Weather Events and Normal Flow Conditions**

#### **2.1.1 Wet Weather Events Flow Regime**

The 2006 Record of Decision defined wet weather flow conditions as flow greater than 50 cubic feet per second (cfs) at monitoring station SS-07 in Silver Bow Creek or greater than 35 cfs at station SS-04 in Blacktail Creek. Subsequent monitoring has found times when these specified flow rates occurred during dry weather flow conditions; thus, the definition needed to be revised. In general, wet weather flow conditions are highly variable and typically occur during rainfall and snowmelt events from spring through early fall, although snowmelt can occur at any time.

For the purposes of compliance monitoring, the terms wet weather flow conditions and wet weather events are defined as when there is measurable outflow, as set forth in the BPSOU SWMP, from the primary outlet of the following main stormwater detention/retention basins within the BPSOU: CB-9 in Missoula Gulch, the Diggings East basin, and the Buffalo Gulch basin. The primary outlet for the basins listed above is the discharge structure that is designed to convey water when the basin storage volume exceeds its maximum storage capacity as defined in Attachment C to the BPSOU SOW.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

Sampling for wet weather compliance would be triggered by the above criteria. For compliance standard determination monitoring and for compliance purposes, arsenic and metals concentrations in samples collected during wet weather flow conditions are compared to acute aquatic ARAR Performance Standards. Column 4 of Table 2-1 lists the acute water quality standards applicable during the compliance standard determination period. After the compliance standard determination is made by EPA, in consultation with DEQ, as described in Section 4.0, the acute water quality standards resulting from that determination will be applicable.

The frequency of wet weather events is dependent on the number and type of storm or snowmelt events, the size of the stormwater basins described above, and the manner in which such basins are constructed and operated. Wet weather flow that has been sampled historically ranged from 4 to 10 events per year under a different flow definition. To account for anomalous weather patterns, the number of wet weather events sampled for compliance standard determination and compliance monitoring purposes is limited to three per month (Section 2.4.1). This document and the BPSOU SWMP require sampling of in-stream surface water to evaluate wet weather events for performance monitoring and compliance purposes (see Section 2.4.1 for further discussion).

Performance or diagnostic samples from storm water outfalls, within basins or at basin outfalls, or in-stream, will be collected pursuant to the BPSOU SWMP and its Standard Operating Procedures (SOPs), but will not be treated as compliance monitoring samples.

Given the past and future efforts to identify and remediate sources of historic mining waste, storm water impacts associated with historic mine waste sources are expected to decrease over time. Therefore, the frequency of storm water sampling for each contaminant of concern may be reduced after 10 years of consistent compliance for that contaminant, as determined through monitoring. The Settling Defendants may submit such a request to EPA and DEQ, which will be considered promptly by EPA in consultation with DEQ. In stream surface water samples collected during a measurable precipitation or snowmelt event shall not be used to evaluate chronic standard compliance or overall protectiveness, even if outflow from the main stormwater retention/detention basins does not occur.

### **2.1.2 Normal Flow Regime Definition**

The term “normal flow” regime is defined as flows outside of the defined wet weather flow regime as defined in Section 2.1.1, and flows outside of



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

a 96-hour time period following a hydrologic change caused by a precipitation or snowmelt event or when one or more of the basins discharges, to allow for streams to return to normal flow conditions. For compliance standard determination monitoring and for compliance purposes, arsenic and metals concentrations in samples collected at normal flow are compared to the more restrictive of chronic aquatic ARAR Performance Standards or human health ARAR Performance Standards (see column 3 of Table 2-1). After the compliance standard determination is made by EPA, in consultation with DEQ, as described in Section 4.0, the normal flow water quality standards resulting from that determination will be applicable for compliance monitoring.

Normal flow samples shall not be collected for at least 96 hours following a hydrologic change caused by a precipitation or snowmelt event or when one or more of the basins discharges, to allow for streams to return to normal flow conditions. Discharge from the basins may be temporarily suspended for the purpose of collecting normal flow samples. Normal flow samples shall also not be collected when upstream precipitation events, such as storms which occur upstream of the BPSOU boundaries, cause elevated flows within Blacktail Creek and Silver Bow Creek below its confluence with Blacktail Creek though no storm event may have occurred within the BPSOU. A hydrologic change refers generally to short-term conditions when discharge in Blacktail or Silver Bow Creeks increases by 40 % over 12 hours or a lesser period of time (which is not a summer event caused by submerged macrophytes), for a period of 96 hours following the 40% increase.

Further detail regarding sampling triggers and methods is included in the BPSOU SWMP. Normal flow samples for compliance standard determination monitoring and for compliance purposes shall be collected in 8 compliance sampling events per year including 4 during base flow conditions and 4 during normal high flow conditions. The frequency of normal flow sampling for each contaminant of concern may be reduced after 10 years of consistent compliance for that contaminant, as determined through monitoring. The Settling Defendants may submit such a request to EPA and DEQ, which will be considered promptly by EPA in consultation with DEQ.

## **2.2 Contaminants of Concern for Compliance Monitoring**

The BPSOU ROD identified nine COCs for surface water within the BPSOU. This SWCDP incorporates the BPSOU ROD list, which includes:

- Aluminum (Al)
- Arsenic (As)



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- Cadmium (Cd)
- Copper (Cu)
- Iron (Fe)
- Lead (Pb)
- Mercury (Hg)
- Silver (Ag)
- Zinc (Zn)

## **2.3 Sampling Parameters**

In accordance with the BPSOU SWMP, all in-stream surface water samples shall be analyzed for all COCs, both total recoverable and dissolved, plus hardness and applicable parameters that are needed to apply the Biotic Ligand Model (BLM) to storm water samples. Additional sampling parameters are set forth in BPSOU SWMP, including field measurements (e.g., pH, temperature, specific conductance, oxidation-reduction potential) and hydrologic measurements (e.g., stage, discharge). Sampling protocol as set forth in the BPSOU SWMP and in the Clark Fork River Superfund Site Investigations Quality Assurance Project Plan and any amendments thereto shall be utilized. Modifications to the sampling requirements may be completed through an EPA-approved (in consultation with DEQ) Request for Change, or through direction by EPA, in consultation with DEQ, and upon agreement by the Settling Defendants.

### **2.3.1 In-Stream Surface Water Quality Performance Standards**

In accordance with the BPSOU ROD, as modified, the in-stream surface water ARAR Performance Standard compliance requirements are set forth below.

For compliance purposes, COC concentrations in samples collected during wet weather events are compared to acute aquatic standards, and COC concentrations in samples collected during normal flow conditions are compared to the more restrictive of chronic aquatic standards or human health standards, all as identified in Table 2-1.

Table 2-1 summarizes the applicable in-stream surface water ARAR Performance Standards for each flow regime. Chronic aquatic life standards are based on 4-day average concentrations. Acute aquatic life standards are based on 1-hour average concentrations. Human health standards are discrete and do not have an averaging period.

Surface water ARAR Performance Standards shown below were determined in the 2006 BPSOU Record of Decision (see page 8-7), except as noted.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**Table 2-1: In-Stream Surface Water Performance Standards**

COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4	COLUMN 5
CONTAMINANT	FRACTION	NORMAL FLOW COMPLIANCE STANDARD (The more stringent of the Chronic Aquatic or Human Health standard) <sup>c</sup>	WET WEATHER EVENT COMPLIANCE STANDARD (Acute Aquatic standard) <sup>c</sup>	REPLACEMENT STANDARD, IF NECESSARY BASED ON THE COMPLIANCE STANDARD DETERMINATION PROCESS DESCRIBED BELOW <sup>c,d</sup>
Aluminum	Dissolved for Chronic and Acute <sup>a</sup>	87 µg/L	750 µg/L	None – currently in compliance.
Arsenic	Total Recoverable for Chronic and Acute	10 µg/L	340 µg/L	None – elevated normal flow arsenic due to sources upstream of BPSOU. In compliance with acute standard.
Cadmium <sup>f</sup>	Total Recoverable for Chronic and Acute	0.26 µg/L	0.49 µg/L	Acute - 0.49 µg/L, measured as dissolved <sup>b</sup> Chronic – none, currently in compliance
Copper	Total Recoverable for Chronic; Dissolved for Acute <sup>b</sup>	2.85 µg/L	3.6 µg/L	Acute – Biotic Ligand Model <sup>c</sup> Chronic – Biotic Ligand Model <sup>c</sup>
Iron	Total Recoverable for Chronic	1,000 µg/L	NA	Acute – NA None – elevated iron due to sources upstream of BPSOU.
Lead	Total Recoverable for Chronic and Acute	0.545 µg/L	13.98 µg/L	Acute - 14 µg/L measured as dissolved Chronic - 0.54 µg/L, measured as dissolved.
Mercury	Total Recoverable for Chronic and Acute	0.05 µg/L	1.7 µg/L	None - acute standard currently in compliance. Occasional exceedances of human health standard are addressed in stipulated penalty and Additional Work provisions.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

Silver	Total Recoverable for Acute	NA	0.374 µg/L	Acute - 0.30 µg/L, measured as dissolved.
Zinc	Total Recoverable for Chronic; Dissolved for Acute <sup>b</sup>	37 µg/L	37 µg/L	Acute – applicable Federal standard at time of Compliance Standard Determination  Chronic – none, currently in compliance.

Notes:

- a. The DEQ-7 standards for aluminum refer to the dissolved fraction and do not represent a waiver of a ROD standard.
- b. The DEQ-7 standards for acute copper and zinc are waived and replaced with federal water quality criteria based on Section 121(d)(4)(C) of CERCLA, 42 U.S.C. § 9621(d)(4)(C), referred to as the technically impracticable waiver.
- c. Standards for cadmium, copper, lead, silver and zinc are hardness dependent. Values shown are calculated at a hardness of 25 mg/L unless otherwise shown.
- d. Numeric replacement standards identified in this column are based on published federal water quality criteria, issued pursuant to Section 403(a) of the federal Clean Water Act, 33 U.S.C. § 1314(a). See <https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table>. All contaminants will be eligible for replacement to other federally accepted standards for determining compliance if necessary – see Attachment D to the BPSOU SOW.
- e. The Biotic Ligand Model (BLM) standard in place at the time of compliance standard determination shall be the Replacement Standard for copper for both chronic and acute conditions. For acute conditions (wet weather events), the BLM standard or any other appropriate EPA-approved methodology that will perform in non-equilibrium conditions such as stormwater or diel pH cycling shall be used. The criteria for defining frequency for collection of individual parameters will be defined in the SWMP.
- f. Cadmium standards are updated to the April 2017 Circular DEQ-7 values. Compliance Monitoring Stations

### 2.3.2 Downstream Compliance Stations – SS-06G and SS-07

The downstream compliance monitoring stations for the BPSOU are SS-06G and SS-07.

The stations are located in Silver Bow Creek. SS-06G is near the end of the BTL but just upstream of the Metro Sewer effluent discharge. SS-07 is near the downstream end of the BPSOU. These stations have a long record of monitoring with automated equipment during wet weather events and also as normal flow stations.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**2.3.3 Upstream Compliance Assessment Station – SS-01**

The upstream compliance assessment monitoring station for the BPSOU is SS-01. The upstream compliance assessment station provides data for COC concentrations upstream of BPSOU. Data will be collected at the SS-01 compliance assessment monitoring station for each COC and the other required sampling parameters, as described in the BPSOU SWMP, for use in the upstream comparison protocol (see Section 3.3). The Settling Defendants (Atlantic Richfield with the concurrence of Butte Silver Bow County) may propose re-location and/or one or more new upstream compliance assessment monitoring station(s) to recognize significant changes to stream flow or water quality entering BPSOU. The new upstream location(s) may replace or be proposed in addition to the existing upstream assessment station (SS-01). Any such change or changes is/are subject to EPA and DEQ approval. Should EPA and DEQ not reach agreement on whether to approve a change in the upstream assessment station, the dispute will be resolved pursuant to the SMOA. If that process results in a denial of the SDs request, that decision is subject to Dispute Resolution pursuant to Section XV of the Consent Decree.

**2.4 Type of Monitoring/Sampling**

**2.4.1 Wet-Weather Sampling Protocol and Sampling Frequency**

To the extent practicable, during wet weather flow conditions samples shall be collected using automated equipment, within the wet weather flow regime defined in Section 2.1.1, and the number of wet weather events that would be sampled shall be limited to three per month.

A 1-hour measure or, in the alternative, an averaging period of 1 hour shall be used for measuring compliance during wet weather events. To the extent practicable, a 1-hour measurement shall be collected using the compositing features of the automated sampling equipment. If not practicable (such as during a snow melt event), manual sampling may be utilized, if such sampling can be completed in accord with applicable federal and State health and safety regulations and the SWMP.

Wet weather sample collection shall be initiated based on a trigger when the condition described in Section 2.1.1 occurs. Sampling stations for performance monitoring will be further described in the BPSOU SWMP.

**2.4.2 Normal Flow Sampling Protocol**

In accordance with the ROD, normal flow monitoring shall consist of manually collecting stage, flow, and water quality data for a total of 8 compliance sampling events per year including 4 during base flow conditions and 4 during normal high flow conditions, collected consistent with the BPSOU SWMP. Sampling shall be integrated across the cross-



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

section of the stream at each compliance station. COCs from this sampling method shall be directly compared to the normal flow in-stream surface water ARAR Performance Standards described above and in accordance with Section 3.2 below. In order to be consistent with historical data, compliance sampling shall be conducted in the morning hours beginning with station SS-07.

As noted previously, normal flow compliance samples shall not be collected for at least 96 hours following a precipitation or snowmelt event or when one or more of the basins discharges to allow for streams to return to normal flow conditions. Discharge from the basins may be temporarily suspended for the purpose of collecting normal flow samples. Normal flow samples shall also not be collected when upstream precipitation events, such as storms which occur upstream of the BPSOU boundaries, cause elevated flows within Blacktail Creek and Silver Bow Creek below its confluence with Blacktail Creek though no storm event may have occurred within the BPSOU.

Additional performance samples for normal flow may include United States Geological Survey (USGS) sampling data and additional samples collected under the SOP within the BPSOU SWMP but are not required by this SWCDP.

### **3.0 PROCEDURES FOR COMPARISON TO IN-STREAM SURFACE WATER PERFORMANCE STANDARDS**

The following procedures apply during the compliance standard determination monitoring period and during compliance monitoring. See Figure 3-1 for a summary of this process.

#### **3.1 Sample Averaging**

Aquatic standards used as Performance Standards are based on time of exposure and allow averaging of samples to obtain the appropriate concentrations for comparison to the standards.

Acute aquatic standards are based on a 1-hour exposure, and an average concentration during a 1-hour period is appropriate. Section 2.4.1 specifies that a 1-hour composite sample should be collected to meet this data need. If a composite sample is unavailable, two discrete samples collected within 1 hour can be averaged to obtain a 1-hour average result. Composite samples should not be averaged to obtain a 1-hour average concentration unless the total time span of the composite samples is 1 hour or less.

Chronic aquatic standards are based on a 4-day exposure period, and samples used for comparison to this standard are generally a single discrete sample. Samples



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

collected within a contiguous 4-day period may be averaged to obtain an average concentration.

Human health standards are discrete and do not have an averaging period.

### **3.2 Comparison to Performance Standards**

Certain performance standards vary based on hardness and instantaneous water quality criteria for BLM in the stream, and this calculation shall be made to determine the surface water Performance Standards identified in Table 2-1. If compliance samples at the point of compliance are to be averaged, this averaging must also be conducted before the averaged samples are compared with Performance Standards.

Comparison of compliance sample COC concentrations are subject to variability due to many factors, including variations in sampling and analytical processes in the specific aliquot of water to be sampled and variability in timing of the sampling attempting to compare the same or similar aliquots of water between two different sampling points in the stream. To allow for sampling and analysis uncertainty, the contaminant concentrations in the compliance samples shall be reduced by 10 percent of the reported concentration.

If the adjusted COC concentration in the downstream sample is less than or equal to the performance standard, the sample is in compliance. If the COC concentration in the downstream sample exceeds the performance standard, comparison to upstream is conducted.

SDs shall prepare and submit by June 30<sup>th</sup> of each year, a draft Surface Water Compliance Comparison and Interpretation Report. The description and content of the report is included in Section 7.3 of the SWMP and shall be prepared annually by the SDs.

### **3.3 Comparison to Upstream**

To account for COC contributions entering the BPSOU from upstream, the upstream comparison methodology shall be applied when appropriate. If the upstream concentration is greater than the adjusted downstream compliance concentration for that COC, there is no exceedance. An exceedance occurs when the adjusted compliance concentration at a point of compliance (SS-07 or SS-06G) exceeds the Performance Standard and the COC upstream concentration.

### **3.4 Allowable Exceedance Rates**

As stated in AWQC documentation, one exceedance of the aquatic life standards is allowable per 3 years. No exceedances are allowable for human health standards.

Exceedances are counted on an event basis. If one or more downstream samples collected during a single storm event is determined to exceed one standard following the methods in Section 3.2, then one exceedance of that standard has



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

occurred for that storm event. Multiple exceedances occurring in one storm event are not additive, and only a single event exceedance is enumerated. Similarly, exceedances are counted per standard. If more than one standard is exceeded in a storm event, the exceedances are not additive, and exceedances would be enumerated as one per standard for that storm event.

During the compliance standard determination monitoring period only, any exceedance that results from a failure of a surface water related remedial element, including the failure of Settling Defendants to operate or maintain a surface water related remedial element, is not counted as an exceedance for purposes of the compliance standard determination monitoring, as described in Section 4.0 below. Paragraphs 6 and 7 of Section 4.0 describe the manner in which the Settling Defendants will address the potential exclusion of exceedances described in this paragraph.

#### **4.0 COMPLIANCE STANDARD DETERMINATION AND USE OF REPLACEMENT STANDARDS**

The SWCDP and the steps described below indicate how the compliance standard determination monitoring period and the compliance standard determination decision by EPA, in consultation with DEQ, at the conclusion of that monitoring period, will be implemented. Compliance assessments and determinations after the compliance standard determination decision is issued are separate steps and issues, addressed in Sections 5.0 through 7.0.

The compliance standard determination monitoring period shall begin upon approval of the KRECCR, as defined in Section 1.0 of the SWCDP.

The compliance standard determination monitoring period shall last for nine (9) years or a longer period of time if needed to observe and sample a wet weather event as defined in Section 2.1.1, not to exceed twelve years.

Within 120 days after the receipt of validated data collected during the full compliance standard determination monitoring period, EPA, in consultation with DEQ, shall make a compliance standard determination for in-stream surface water standards, based on the sampling data and the protocols described in this SWCDP and the BPSOU SWMP.

Data collected at downstream compliance measurement stations will be compared to Performance Standards and upstream concentrations to determine compliance with Performance Standards for in-stream COCs, as described in Section 3.0 above.

During the compliance standard determination period only, if more than three exceedances of a contaminant ARAR is detected in a 9 year period (or a longer period of time if needed to observe and sample a wet weather event as defined in Section 2.1.1, not to exceed twelve years), then the Replacement Standard for that contaminant of concern (identified in Table



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

2-1, fifth column) shall become the applicable in-stream surface water ARAR Performance Standard, unless any one of the three exceedances resulted from a failure of a surface water related remedial element, including the failure of Settling Defendants to operate or maintain a surface water related remedial element as required by the applicable operation and maintenance plans (including operation and maintenance plans related to groundwater controls), other than such failures which are related to the exceedance in a de minimis manner.<sup>2</sup>

Upon request by EPA or DEQ, or upon the Settling Defendants' notice to EPA and DEQ, within 45 days of such request or notice, the Settling Defendants shall investigate and report on whether a failure to operate or maintain a surface water related remedial element occurred for a given exceedance. Further discussion of this investigation and report is found in the SWMP. Such reports are subject to the approval of EPA, in consultation with DEQ. Within 120 days following submission of the Settling Defendants' report, EPA, in consultation with DEQ, shall provide Settling Defendants with a written notice that identifies each surface water related remedial element that Settling Defendants' failed to operate or maintain during any event for which EPA claims an exceedance resulted from such failure, if any. This notice and the findings therein shall be subject to review under the Dispute Resolution provisions of the Consent Decree. Replacement Standards are evaluated and applied on a per COC and per flow condition basis. The standards determined in this manner will apply during subsequent compliance monitoring.

## **5.0 CORRECTION OF REMEDIAL ELEMENTS RELATED TO IN-STREAM SURFACE WATER**

If at any time after the Effective Date of the Consent Decree there is a failure to perform a remedial element related to surface water or to operate and maintain a surface water-related remedial element in accordance with the approved operation and maintenance plans, the Settling Defendants shall promptly correct any such conditions, and report in writing on their efforts to EPA and DEQ. Such reports are subject to the approval of EPA, in consultation with DEQ.

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<sup>2</sup> For purposes of the SWCDP, "de minimis" shall mean quantities of contaminants of concern measured in a specific release or failure event which are negligible in comparison to the eventual impact of such a release on in-stream performance standard exceedances. A determination of "negligible" is event and site specific. Any rejection of a "de minimis" finding by EPA in consultation with DEQ is subject to the Dispute Resolution provisions of the Consent Decree.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **6.0 COMPLIANCE DETERMINATION AND PENALTY APPLICATION FOR IN-STREAM PERFORMANCE STANDARDS**

No claim for stipulated or statutory penalties against the Settling Defendants for alleged noncompliance with any in-stream surface water Performance Standards including Replacement Standards shall arise under this Consent Decree. Stipulated and statutory penalties are applicable to the implementation of response actions, in accordance with Section XVI of the Consent Decree.

## **7.0 ADDITIONAL WORK UNDER PARAGRAPH 27 OF THE CD TO ADDRESS IN-STREAM SURFACE WATER PERFORMANCE STANDARD EXCEEDANCES**

If an exceedance of in-stream chronic (normal flow) surface water Performance Standard is found during the compliance standard determination monitoring period or if an exceedance of a chronic standard is found during compliance monitoring, the process for the determination of further remedial action (hereinafter “Additional Work”) pursuant to Paragraph 27 of the CD is described in Section 7.1 and shown in Figure 7-1. If an exceedance of an in-stream acute (wet weather flow) in-stream surface water Performance Standard occurs during such monitoring, the process for determination of Additional Work pursuant to paragraph 27 of the CD is described in Section 7.2 and shown in Figure 7-1.

For the purposes of Additional Work requirements pursuant to Paragraph 27 of the CD, this Section and Figure 7-1, “Diagnostic Response Investigation” is limited to actions to investigate and address Historic Mine Waste Source(s), remedy elements, or operation and maintenance failures, through investigations and response actions, if required, within the “Scope of the Remedy selected in the ROD” (hereinafter referred to as the “Scope of the Remedy”) as described below and in Section 1.3 of the BPSOU SOW.

For purposes of Section 7 of the SWCDP only (and its application to Paragraph 27 of the Consent Decree), Historic Mine Waste Source shall mean a source, or a combination of sources, such as former mine yards; pre-1980 waste rock piles; pre-1980 mining, milling or smelting wastes (excluding historic smelter emissions); pre-1980 tailings impoundments; or open pit mines within the BPSOU.

Historic Mine Waste Source does not include:

- a. A source which is substantially from a primary source located outside of the BPSOU surface boundary;
- b. A source which is associated with such things as metal-bearing construction materials (such as copper piping or wire, lead solder or fittings, copper or galvanized roofing material) of homes or businesses or other commercial structures; or



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- c. A source which is controlled by an existing, enforceable and separate regulatory program such as activities governed by the Butte Silver Bow County ordinance governing stormwater control at construction activities.

For the purposes of the SWCDP only, the “Corridor” shall mean all areas within the BPSOU that do not drain to: (a) one of the main stormwater basins located within Missoula Gulch, Buffalo Gulch, Diggings East, or Northside Tailings; or (b) any storm water basins constructed under Attachment C, Sections 4 or 9 (Further Remedial Elements Scope of Work). The Corridor includes streambeds, banks, and adjacent floodplains of Silver Bow Creek below its confluence with Blacktail Creek and Blacktail Creek within the BPSOU and located downgradient of the described stormwater basins and controls; areas immediately adjacent to Silver Bow above its confluence with Blacktail Creek, Silver Bow Creek below its confluence with Blacktail Creek, and Blacktail Creek; uncontrolled surface water runoff areas on the Butte Hill (e.g. Montana Street storm sewer outlet drainage area); and areas within the stormwater basins footprints. No new BMPs are required within the Montana Street stormwater drainage area or outfalls / runoff from I-90 to surface water. These structures collect storm water from urban sources and not from an Historic Mine Waste Source. Notwithstanding the prior sentence, the existing Montana Street HDD shall be maintained by the SDs, and SDs will investigate, propose and implement low impact BMPs to address unpaved areas within the Montana Street stormwater drainage to address unpaved areas that direct stormwater runoff to surface water. See Figure 7-2.

### **7.1 Diagnostic Response and Additional Work to Address Chronic (Normal Flow) Standard Exceedances**

Upon verification of an exceedance of a chronic standard, the process detailed in Figure 7-1 shall be used to determine the response and Additional Work, if any. A key requirement in this process is the performance of a Diagnostic Response Investigation and resulting report. Any Additional Work to address an exceedance of chronic in-stream Performance Standards shall be limited to the “Corridor” and the Settling Defendants shall not be required to search for Historic Mine Waste Sources outside of that defined area. However, this does not preclude the Settling Defendants from performing O&M improvements and remedial actions outside of the Corridor at their discretion.

Such investigations in accordance with Figure 7-1 shall not exceed six months.

Other steps to be performed by the Settling Defendants in addition to those steps described in Figure 7-1 to help identify the cause of exceedances may include some or all of the following elements:

- Additional diagnostic monitoring at in-stream stations for normal flow events, as appropriate;
- Additional normal flow diagnostic monitoring of in-stream sediments and groundwater, as appropriate.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

Once the Diagnostic Response Investigation within the Corridor, as required, is complete, Settling Defendants shall submit a Diagnostic Response Investigation report with all investigation data, and Settling Defendants' findings regarding whether the exceedance(s) is/are attributed to an Historic Mine Waste Source or a combination of Historic Mine Waste Sources, O&M failure or failure of constructed remedy elements. The report shall detail the nature and extent of such source(s) (if located) or failure of constructed remedy elements or O&M failures, and recommended Additional Work within the Scope of the Remedy as described in Section 1.3 of the BPSOU SOW and as shown in Figure 7-1, as appropriate, to mitigate the potential for further exceedances. The report may also address the de minimis nature of the contribution to the exceedance(s) from the Historic Mine Waste Source, the combination of Historic Mine Waste Sources, or failure of constructed remedy elements. Such reports are subject to the approval of EPA, in consultation with DEQ.

EPA, in consultation with DEQ, will consider the Diagnostic Response Investigation report and any other pertinent information, and determine if the exceedance(s) is/are related to a release from an Historic Mine Waste Source or a combination of Historic Mine Waste Sources or failure of constructed remedy elements or O&M failure within the BPSOU. The frequency, magnitude, and whether such exceedances are de minimis shall also be considered when making this determination.

If EPA, in consultation with DEQ, does not agree with the scope of the Diagnostic Response Investigation conducted by Settling Defendants, or the findings set forth by Settling Defendants in the submitted Diagnostic Response Investigation report, EPA, in consultation with DEQ, may conduct further investigations within the Corridor and collect additional empirical data to determine whether the cause of the exceedance is from an Historic Mine Waste Source or a combination of Historic Mine Waste Sources and the contribution from that source is not de minimis.

The Diagnostic Response Investigation will be further described in a SOP within the BPSOU SWMP.

EPA, in consultation with DEQ, may require the following Additional Work actions (as described in Section 1.3 of the BPSOU SOW):

To mitigate exceedances of chronic in-stream Performance Standards, the Scope of the Remedy includes only:

- (i) Optimization of Butte Site groundwater interception, control and treatment structures and systems in place after Remedy construction, such as system enhancements, installation of extraction wells, and/or expanded interception of impacted groundwater, or enhancement of treatment facility operations;



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- (ii) Capping and/or revegetation of an Historic Mine Waste Source within the Corridor, as defined in Section 7.0 of this SWCDP; and
- (iii) Removal of contaminated in-stream sediments, in accordance with the protocols set forth in the SWMP, determined to be impacted by groundwater in contact with a Historic Mine Waste Source or re-contaminated by a Historic Mine Waste Source, as defined in Section 7.0 of this SWCDP, utilizing the diagnostic evaluation process described in the SWMP.

Except as described in Section 1.3(d)(3)(iii) of the BPSOU SOW, EPA, in consultation with DEQ, may not require additional removal / excavation of any Historic Mine Waste Source(s). However, Settling Defendants may, in Settling Defendants sole discretion, propose additional removal / excavation of any Historic Mine Waste Source(s) or O&M improvements to address non-compliance with a chronic in-stream Performance Standard.

If EPA, in consultation with DEQ, conducts additional investigations and determines an Historic Mine Waste Source or a combination of Historic Mine Waste Sources located within the Corridor is a cause of one or more chronic standard exceedances at a point of compliance during normal flow conditions, Settling Defendants shall have the right to challenge that determination through the Dispute Resolution process provided in the Consent Decree. If EPA's determination is upheld, the Settling Defendants shall be required to remediate the Historic Mine Waste Source(s) in a manner consistent with this Section 7.1 and the Modification of the BPSOU SOW provisions of the Consent Decree found in paragraph 27 of the Consent Decree, and reimburse EPA's investigation costs as provided in the Consent Decree. If EPA's determination is overturned in the Dispute Resolution process, EPA may not require Settling Defendants to remediate the Historic Mine Waste Source, and EPA may not recover its costs of investigation of this source from Settling Defendants.

## **7.2 Diagnostic Response and Additional Work to Address Acute (Wet Weather) Standard Exceedances**

Upon verification of an exceedance of an acute (wet weather) in-stream performance standard, the process detailed in Figure 7-1 shall be used to determine the response and Additional Work, if any. A key requirement in this process is the performance of a Diagnostic Response Investigation and resulting report, which will be based on performance monitoring data collected at or near the time of the exceedance. Additional Work by the Settling Defendants to address an exceedance of acute Performance Standards is limited to optimization of surface water-related remedial elements within the Scope of the Remedy as described below and in Section 1.3 of the BPSOU SOW and as shown in Figure 7-1, as appropriate.

Appropriate optimization, as determined by EPA in consultation with DEQ, will be based on the nature and extent of the exceedance and the ability of optimization to



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

improve in-stream water quality. Additional removal / excavation of any Historic Mine Waste Source(s) or additional storm water controls may not be required as Additional Work to address an exceedance of an acute in-stream Performance Standard.

Upon a finding of an exceedance, the Settling Defendants may take the following steps in addition to those described in Figure 7-1 to help identify the cause of an acute standard exceedance:

- Additional diagnostic monitoring at in-stream stations for wet weather events, as appropriate;
- Additional diagnostic monitoring during wet weather events at the outfalls of major storm water discharge points, as appropriate.

Once the Diagnostic Response Investigation within the Corridor, as required, is complete, Settling Defendants shall submit a Diagnostic Response Investigation report with all investigation data, and Settling Defendants' findings regarding whether the exceedance(s) is attributed to an Historic Mine Waste Source or a combination of Historic Mine Waste Sources, O&M failure or failure of constructed remedy elements. The report shall detail the nature and extent of such source(s) (if located through investigation within the Corridor) or failure of constructed remedy elements or O&M failures, and recommended Additional Work within the Scope of the Remedy as described in Section 1.3 of the BPSOU SOW and as shown in Figure 7-1, as appropriate, to mitigate the potential for further exceedances. The report may also address the de minimis nature of the contribution to the exceedance(s) from the Historic Mine Waste Source, the combination of Historic Mine Waste Sources, or failure of constructed remedy elements. Such reports are subject to the approval of EPA, in consultation with DEQ.

EPA, in consultation with DEQ, will consider the Diagnostic Response Investigation report and any other pertinent information, and determine if the exceedance(s) is/are related to a release from an Historic Mine Waste Source or a combination of Historic Mine Waste Sources or failure of constructed remedy elements or O&M failure within the BPSOU. The frequency, magnitude, and whether such exceedances are de minimis shall also be considered when making this determination.

If EPA, in consultation with DEQ, does not agree with the scope of the Diagnostic Response Investigation conducted by Settling Defendants, or the findings set forth by Settling Defendants in the submitted Diagnostic Response Investigation report, EPA, in consultation with DEQ, may conduct further investigations within the Corridor and collect additional empirical data to determine whether the cause of the exceedance is from an Historic Mine Waste Source or a combination of Historic Mine Waste Sources and the contribution from that source is not de minimis.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

The diagnostic response investigation will be further described in a SOP within the BPSOU SWMP.

Optimization of surface water-related remedial elements is limited to the following:

To mitigate exceedances of acute in-stream Performance Standards, the Scope of the Remedy includes the Optimization Elements listed in subparagraphs (i) through (iii) only, as described below. Nothing in the BPSOU SOW prevents the Settling Defendants from considering these Optimization Elements in design, and the elements that are supported by the design engineering analysis will be installed in addition to the Work outlined in the Further Remedial Element Scope of Work (Attachment C to the BPSOU SOW), to allow for post-construction optimization of the surface water remedy. The Scope of the Remedy does not include major infrastructure modifications except as defined below after KRECCR approval to construct any Optimization Elements that would require the demolition or reconstruction of previously completed Remedial Elements. The Optimization Elements are:

- (i) Adjustable Diversion and Outlet Structures. Diversion and outlet structures will integrate removable weir plates or stop logs, adjustable screw gates, and/or variable diameter and elevation orifice outlets, as appropriate, to manipulate retained/detained volume and discharge rate at the primary basin discharge point and potentially within each basin's respective forebay.
- (ii) Basin Segregation. The interior of the basins may be segregated to promote confinement of sediment accumulation, to optimize the treatment flow path, and to enhance future land use. Segregation could be completed by general grading, development of micro-pools, construction of berms or structural walls, or installation of turbidity curtains. As appropriate, adjustable outlet structures would be installed similar to those discussed in Optimization Element 1.
- (iii) Logic and Controls. Logic and controls will be considered during the final design process. Control and monitoring devices may accommodate automated system adjustment based upon measured surface water quality at each respective BMP discharge and/or at the Silver Bow Creek compliance monitoring point. A supervisory control and data acquisition (SCADA) system with programmable logic controller(s), proportional-integral-derivative (PID) controllers, and communication systems would be installed and networked as needed to provide necessary operational function.

If EPA, in consultation with DEQ, conducts additional investigations and determines an Historic Mine Waste Source or a combination of Historic Mine Waste Sources located within the Corridor is a cause of one or more acute standard exceedances at a point of compliance during wet weather flow conditions, Settling Defendants shall have the right to challenge that determination through the Dispute Resolution process provided in the Consent Decree. If EPA's determination is



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

upheld, the Settling Defendants shall be required to remediate the Historic Mine Waste Source(s) in a manner consistent with this Section 7.2 and the Modification of the BPSOU SOW provisions of the Consent Decree found in paragraph 27 of the Consent Decree, and reimburse EPA's investigation costs as provided in the Consent Decree. If EPA's determination is overturned in the Dispute Resolution process, EPA may not require Settling Defendants to remediate the Historic Mine Waste Source, and EPA may not recover its costs of investigation of this source from Settling Defendants.

### **7.3 Further Waivers**

Any time after the Compliance Standard Determination provided by EPA in consultation with DEQ, the Settling Defendants may petition EPA and DEQ to issue a further technical impracticability waiver of in-stream surface water ARAR Performance Standards including any Replacement Standards, as set forth in Attachment D to the BPSOU SOW. Any further waiver of an in-stream surface water ARAR Performance Standard granted by EPA and DEQ would include a Replacement Standard which would become the in-stream surface water quality Performance Standard. See Figure 7-3.

## **8.0 BUTTE TREATMENT LAGOONS**

Effluent from the Butte Treatment Lagoons (BTL) must meet federal and state point source discharge standards prior to discharge into Silver Bow Creek. Compliance standards for the BTL discharge are detailed below.

### **8.1 Remaining Remedial Elements Activities**

It should be noted that any changes in conditions due to the remaining surface water Key Remedial Elements with respect to treatment volumes at the BTL would result in the extension of the shakedown period, as described in Section 1.0, Introduction.

### **8.2 Upset Conditions**

If periodic and/or atypical contributions to the BTL or other BMPs could cause upset conditions, Settling Defendants shall notify EPA and DEQ promptly. The definition of upset conditions is:

“Upset” means an exceptional incident in which there is unintentional and temporary noncompliance with effluent limitations because of factors beyond the reasonable control of Settling Defendants. An upset does not include noncompliance caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

### **8.3 Butte Treatment Lagoon Performance Standards**

The BPSOU ROD identifies certain DEQ-7 standards as the Performance Standards for the BTL discharge. Table 8-1 identifies these standards. Monitoring and



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

reporting requirements for these Performance Standards are described in Section 7.0 of the BTL Groundwater Treatment System Routine Operations, Maintenance, and Monitoring (OM&M) Plan.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**Table 8-1: Butte Treatment Lagoon Discharge Standards After Conclusion of any Shakedown Period**

CONSTITUENT	FRACTION	BTL EFFLUENT STANDARD	NOTES
Aluminum*	Dissolved	87 µg/L	Chronic aquatic standard
Arsenic	Total Recoverable	10 µg/L	Human health standard
Cadmium	Total Recoverable	0.097 µg/L @ 25 mg/L hardness	Chronic aquatic standard
Copper	Total Recoverable	2.85 µg/L @ 25 mg/L hardness	Chronic aquatic standard
Iron	Total Recoverable	1,000 µg/L	Chronic aquatic standard
Lead	Total Recoverable	0.545 µg/L @ 25 mg/L hardness	Chronic aquatic standard
Mercury	Total Recoverable	0.05 µg/L	Human health standard
Silver	Total Recoverable	0.374 µg/L @ 25 mg/L hardness	No chronic standard listed for silver; thus, acute standard applies to BTL effluent
Zinc	Total Recoverable	37 µg/l @ 25 mg/L hardness	Chronic aquatic standard
pH	NA	Between 6.5 and 9.5 standard units	

µg/L = microgram per liter; mg/L = milligram per liter



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**8.4 Interim Monitoring Period and Interim Standards Period for Butte Treatment Lagoon (BTL) Systems to be Applied During Any Shakedown Period**

**A. Interim Monitoring Period – During Construction of Remedial Elements that Affect the Butte Treatment Lagoons**

As described in Section 1.0, an interim monitoring period is necessary during implementation of remedial work that has the potential to affect the BTL operations and prior to the approval of the KRECCR.

The effluent standards described in Table 8-1 will continue to apply during the interim monitoring period in the following manner. The application of the aluminum, arsenic, iron, and mercury standards shown in Table 8-1 will apply without any modification, except that no stipulated or statutory penalties shall apply to exceedances during the interim monitoring period. During the interim monitoring period, the exceedance of discharge standards for cadmium, copper, silver, and zinc standards will not constitute exceedances.

During the interim monitoring period, protocols and BTL corrective actions shall still be followed and documented per the BTL Operations and Maintenance (O&M) plan when discharge concentrations for cadmium, copper, silver, and zinc are above the standards. If appropriate, the SDs shall create an addendum to the O&M Plan for any additional corrective actions for the interim monitoring period to specifically address these parameters.

**B. Interim Standards Period for Recalculation of Hardness-dependent Contaminants – After Construction is Complete**

Upon the approval of the KRECCR, end-of-pipe BTL discharge standards will be recalculated by EPA, in consultation with DEQ, for hardness-dependent contaminants of concern (cadmium, copper, lead, silver, and zinc) for treated water discharged to Silver Bow Creek that considers the receiving water hardness, and mixing of the BTL effluent with the receiving water. Also, standards shall be the lesser of the chronic and human health standard. Based on the recalculated standards, if necessary, the SDs shall determine an optimization plan and timeframe to achieve these standards. EPA, in consultation with DEQ, shall review and approve the SD's implementation of the optimization plan to achieve compliance.

For the duration of the approved optimization timeframe and until optimization is deemed complete based on the approved plan, the BTL will resume standards at calculations derived with a hardness of 400 mg/L and lead at .015 mg/L. The standards for aluminum, arsenic, iron, and mercury will remain the same as described in Table 2-2. These shall be considered BTL end-of-pipe discharge standards for optimization.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

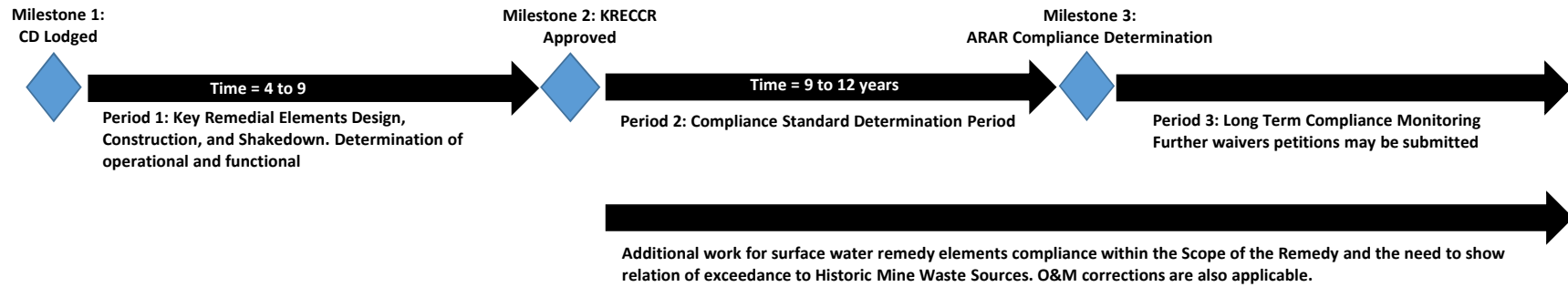
At the end of the optimization timeframe, the BTL must then comply with the final, recalculated standards and be subject to any corrective action requirements and/or penalties. This optimization period does not preclude the BTL from future optimization due to changes in receiving water conditions.

## **9.0 SWCDP MODIFICATIONS**

This SWCDP may be reviewed from time to time during and after the compliance determination monitoring period to evaluate appropriateness and efficacy at measuring compliance with remedial goals. Any revisions to the SWCDP must be adopted in accordance with Paragraph 119 of the Consent Decree. ROD requirements, including compliance monitoring stations and COCs, can only be modified through a ROD amendment or Explanation of Significant Differences.



Figure 1-1. In-Stream Surface Water ARAR Compliance Timeline.



Other Consent Decree provisions, such as the emergency response provisions, new information/unknown conditions reopeners and the general reservations of rights apply as stated in the Consent Decree.



Figure 3-1  
Summary of In-  
Stream Compliance  
Determination  
Process

BPSOU Surface Water  
Compliance  
Determination Plan

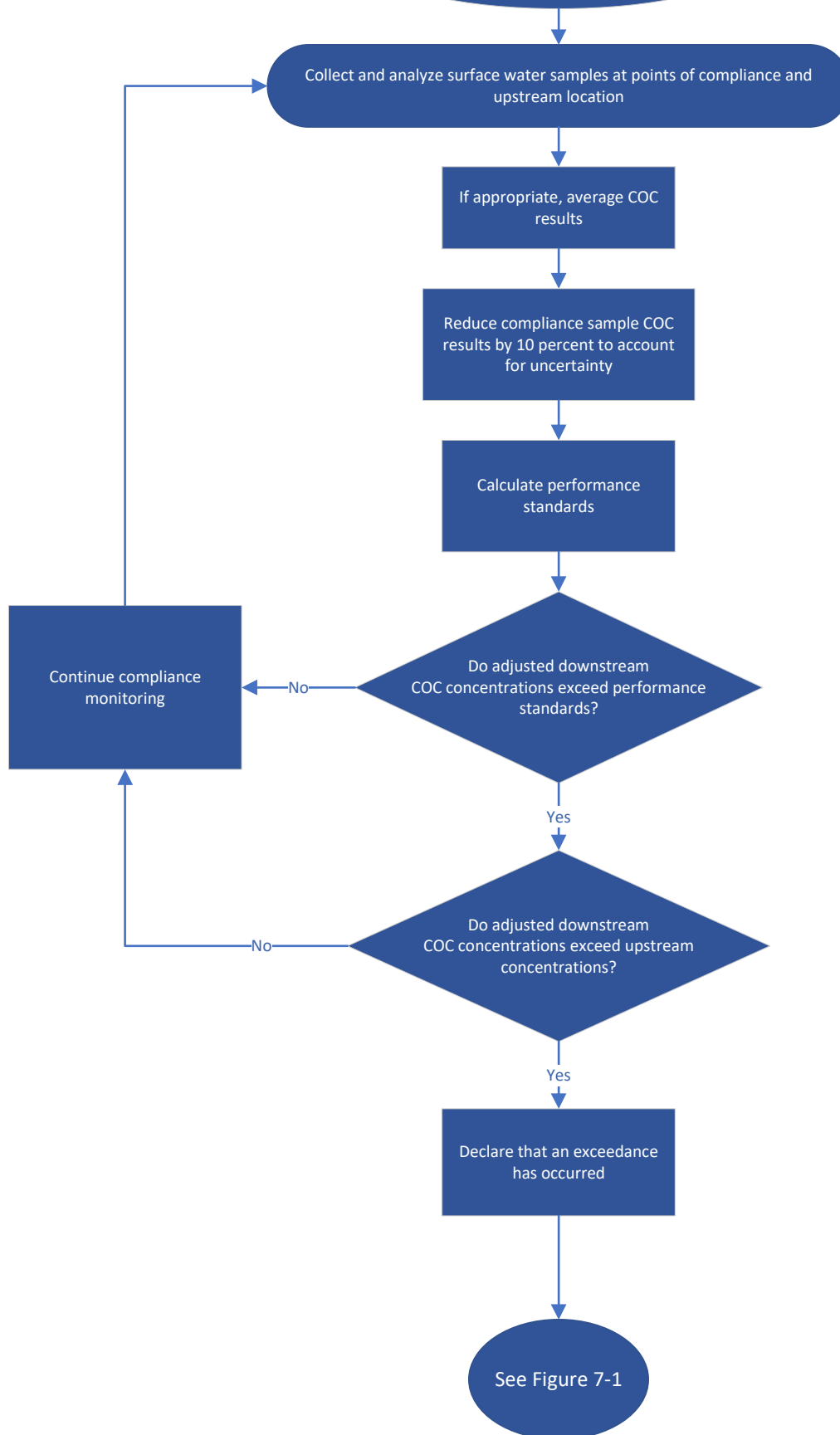
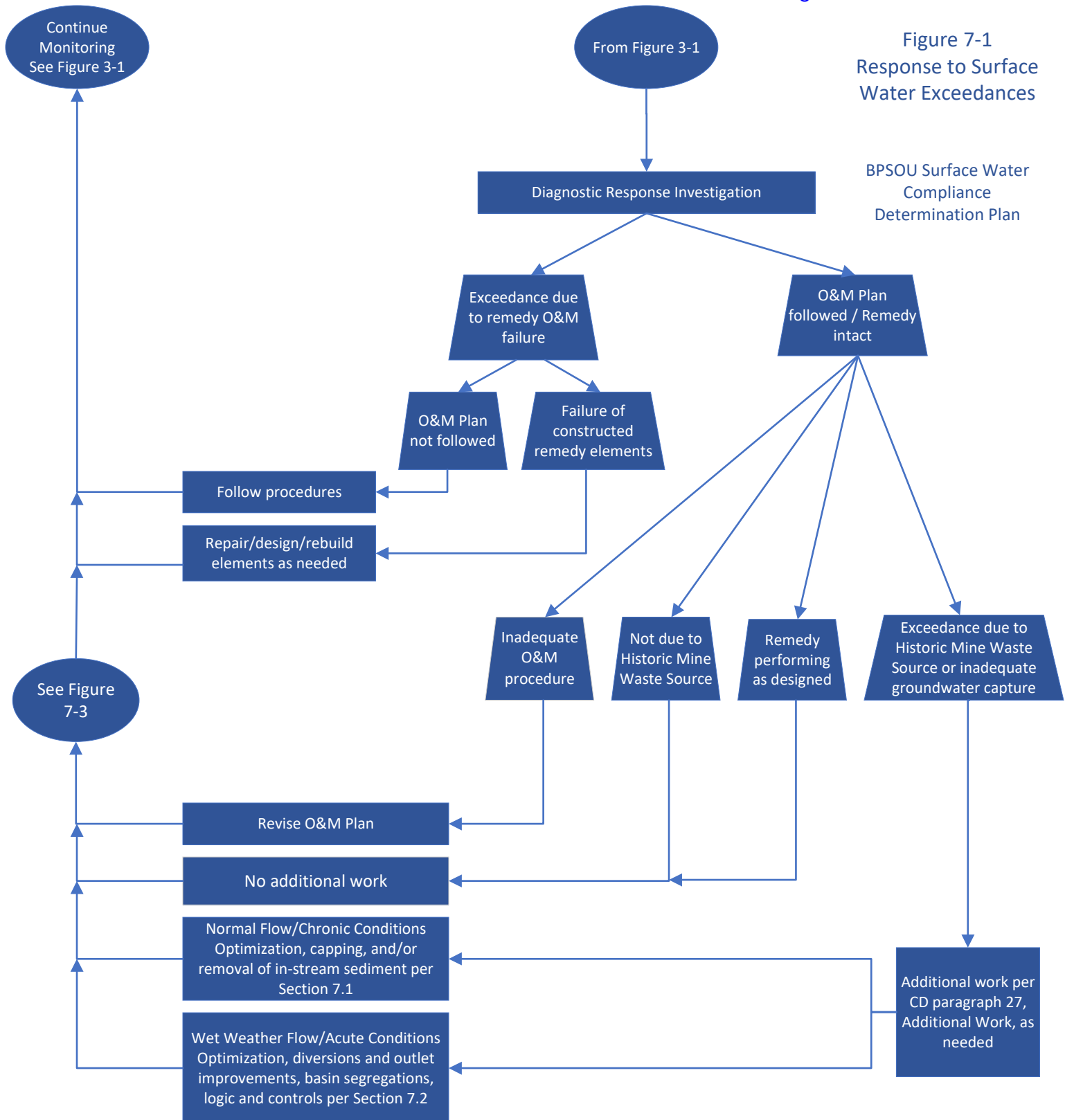




Figure 7-1  
Response to Surface  
Water Exceedances

BPSOU Surface Water  
Compliance  
Determination Plan



**HMWS** = Historic Mine Waste Source shall mean a source, or a combination of sources, such as former mine yards; pre-1980 waste rock piles; pre-1980 mining, milling or smelting wastes (excluding historic smelter emissions); pre-1980 tailings impoundments; or open pit mines within the BPSOU. Historic Mine Waste Source does not include:

- A source which is substantially from a primary source located outside of the BPSOU surface boundary;
- A source which is associated with such things as metal-bearing construction materials (such as copper piping or wire, lead solder or fittings, copper or galvanized roofing material) of homes or businesses or other commercial structures; or
- A source which is controlled by an existing, enforceable and separate regulatory program such as activities governed by the Butte Silver Bow County ordinance governing stormwater control at construction activities.

**O&M** = Operation and Maintenance

**This figure does not alter the actions that EPA or the State may take under the reservation of rights described in the consent decree, Section XVII**



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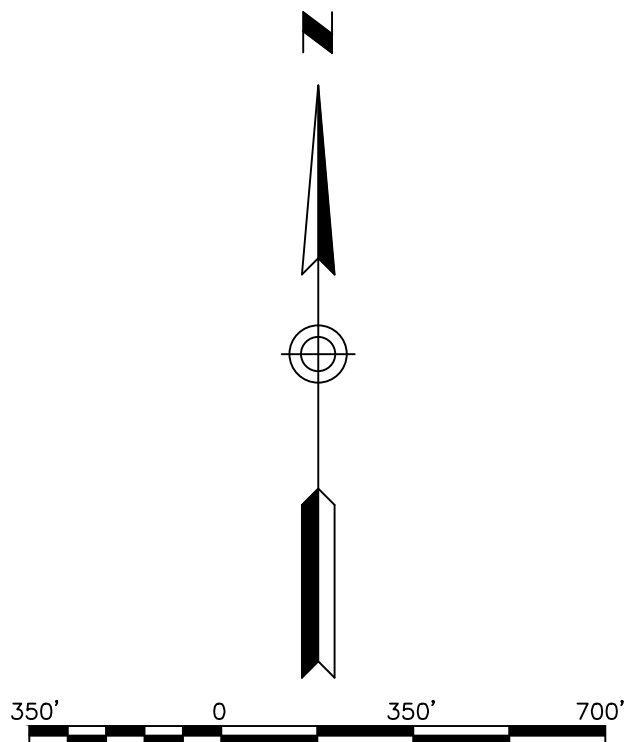


NOTES

1. NO NEW BMPs ARE REQUIRED WITHIN THE MONTANA STREET STORMWATER DRAINAGE AREA OR OUTFALLS/RUNOFF FROM I-90 TO SURFACE WATER. THESE STRUCTURES COLLECT STORMWATER FROM URBAN SOURCES AND NOT FROM HISTORIC MINE WASTE SOURCES.
2. MAGENTA AREAS ON THIS FIGURE REPRESENT THE CORRIDOR, AS DEFINED BY THE COMPLIANCE DETERMINATION PLAN. OTHER AREAS THAT DRAIN TO THE UNCONTROLLED SURFACE FLOW AREA BMPs AND OTHER BMP BASINS, AS CONSTRUCTED, ARE NOT WITHIN THE CORRIDOR. THE UNCONTROLLED SURFACE FLOW AREA BMP LOCATIONS ARE SUBJECT TO THE FINAL DESIGN AS DESCRIBED IN ATTACHMENT C, PART 9 (FURTHER REMEDIAL ELEMENTS SCOPE OF WORK).

LEGEND

- BPSOU BOUNDARY
- PROPOSED REMEDIAL ACTION AREAS
- ADDITIONAL RESPONSE ACTION AREAS



FIGURE

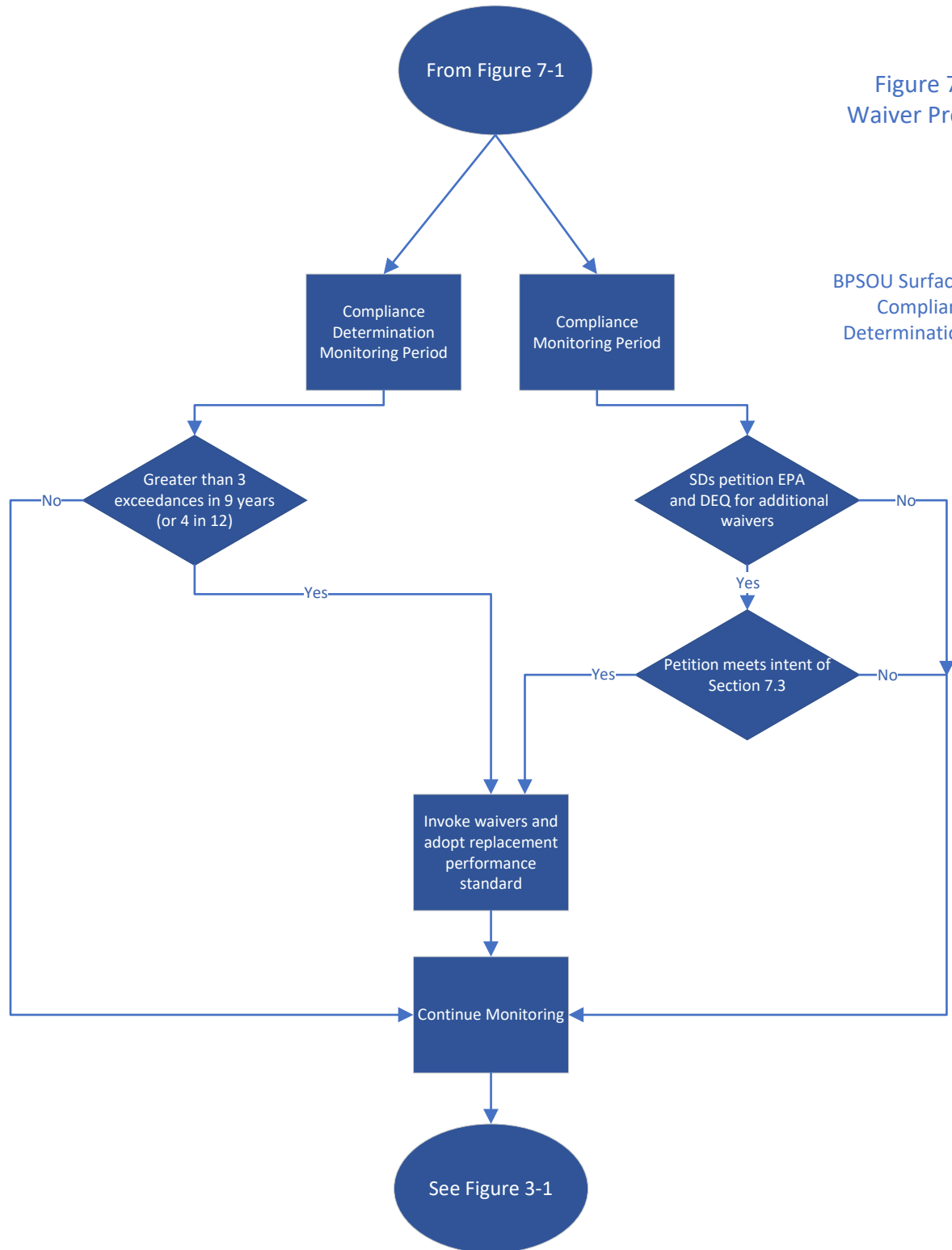
CORRIDOR AREAS FIGURE

ATLANTIC RICHFIELD  
BUTTE, MT

BUTTE PRIORITY SOILS OU

JOB NO.:0231351  
DATE:11-19-2019  
SCALE:1"=350'  
SHEET: 1 OF 1







**BPSOU SURFACE WATER MANAGEMENT PLAN**

**BUTTE PRIORITY SOILS OPERABLE UNIT**

**of the**

**SILVER BOW CREEK / BUTTE AREA SUPERFUND SITE**

**Butte-Silver Bow County, Montana**

**EXHIBIT 1 TO ATTACHMENT A TO APPENDIX D**

**TO THE CONSENT DECREE**



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**TABLE OF CONTENTS**

<b>1.0</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	BPSOU SWMP Scope and Organization .....	2
<b>2.0</b>	<b>SURFACE WATER SITE FEATURES .....</b>	<b>4</b>
<b>3.0</b>	<b>SURFACE WATER REMEDY DESCRIPTION .....</b>	<b>5</b>
3.1	2006 Record of Decision Remedy Components .....	6
3.2	Completed Remedy Work .....	8
3.3	Further Remedial Elements .....	8
<b>4.0</b>	<b>SURFACE WATER MONITORING .....</b>	<b>9</b>
4.1	Wet Weather Conditions .....	10
4.1.1	Wet Weather Definition and Sampling Trigger .....	10
4.1.2	Wet Weather Performance Monitoring .....	11
4.2	Normal Flow Conditions .....	12
4.2.1	Normal Flow Definition and Compliance Sampling Trigger .....	12
4.2.2	Normal Flow Performance Monitoring .....	12
4.3	Schedule for Implementation .....	13
4.4	Monitoring Methodologies .....	13
4.5	Data Reporting .....	14
<b>5.0</b>	<b>SEDIMENT PERFORMANCE MONITORING .....</b>	<b>15</b>
5.1	Data Reporting .....	15
<b>6.0</b>	<b>BENTHIC MACROINVERTEBRATE MONITORING .....</b>	<b>16</b>
6.1	Data Reporting .....	16
<b>7.0</b>	<b>SURFACE WATER MONITORING DATA EVALUATION .....</b>	<b>17</b>
7.1	Compliance Data Evaluations .....	17
7.2	Performance Data Evaluations .....	17
7.3	Surface Water Compliance Comparison and Interpretation Report .....	17
<b>8.0</b>	<b>SEDIMENT AND BENTHIC MACROINVERTEBRATE MONITORING DATA EVALUATION .....</b>	<b>19</b>
8.1	Sediment Data Evaluation .....	19
8.2	Benthic Macroinvertebrate Data Evaluation .....	20
8.3	Sediment Performance Reporting .....	20
<b>9.0</b>	<b>SURFACE WATER DIAGNOSTIC RESPONSE EVALUATION .....</b>	<b>21</b>
9.1	Preliminary Diagnostic Evaluation for a Surface Water Deviation .....	21
9.2	Diagnostic Response Investigation for an Exceedance .....	21
9.3	Responses and Actions .....	22
<b>10.0</b>	<b>SEDIMENT DIAGNOSTIC RESPONSE .....</b>	<b>24</b>
10.1	Preliminary Diagnostic Evaluation for Sediment Deviation .....	24



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

10.2	Diagnostic Response Investigation for a Sediment Deviation.....	24
10.3	Responses and Actions .....	25
10.4	Determining if Additional Sediment Removals are Required .....	27
<b>11.0</b>	<b>BUTTE TREATMENT LAGOONS .....</b>	<b>29</b>
<b>12.0</b>	<b>OPERATIONAL GUIDELINES FOR REMEDY O&amp;M AFFECTING SURFACE WATER AND/OR SEDIMENTS .....</b>	<b>30</b>
12.1	Detention/Retention Basins .....	30
12.2	Contaminated Groundwater Hydraulic Control and Treatment Systems .....	31
<b>13.0</b>	<b>PROJECT MANAGEMENT AND REPORTING.....</b>	<b>32</b>
<b>14.0</b>	<b>REFERENCES.....</b>	<b>35</b>

**LIST OF FIGURES AND TABLES<sup>1</sup>**

Figure 5-1	Typical Discharge Structure with Primary Outlet
Figure 8-1	Summary of Sediment Criteria Comparison Process
Figure 9-1	Response to Surface Water Deviations
Figure 10-1	Response to Annual Sediment Monitoring
Figure 10-2	Response to Quarterly Sediment Monitoring
Table 8-1	Probable Effect Concentrations for Sediment (Ingersoll et al. 2000, MacDonald et al. 2000)
Table 9-1	SWMP Lines of Evidence for Additional Groundwater Hydraulic Control

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<sup>1</sup> The text of this SWMP controls if there is any inconsistency between the text and the Figures of this SWMP.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**LIST OF ACRONYMS**

µg/L	micrograms per liter
ARAR	applicable or relevant and appropriate requirement
BMI	benthic macroinvertebrate
BMP	best management practice
BPSOU	Butte Priority Soils Operable Unit
BRW	Butte Reduction Works
BTC	Blacktail Creek
BTL	Butte Treatment Lagoons
CB-9	Catch Basin 9
CCR	construction completion report
CD	Consent Decree
COC	contaminant of concern
DEQ	Montana Department of Environmental Quality
DSR	Data Summary Report
EPA	U.S. Environmental Protection Agency
KRECCR	Key Remedial Elements Construction Completion Report
LAO	Lower Area One
LTSWM Plan	long-term surface water management plan
NA	not applicable
NPL	National Priorities List
O&M	operations and maintenance
PEC	Probable Effect Concentration
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RA	remedial action
RAO	remedial action objective
RD	remedial design
RG	remedial goal
ROD	2006 Record of Decision, 2011 Explanation of Significant Differences and 2020 Record of Decision Amendment
RPD	relative percent difference
SBC	Silver Bow Creek
SDs	Settling Defendants
BPSOU SOW	BPSOU Statement of Work
SSTOU	Streamside Tailings Operable Unit
SWCDP	surface water compliance determination plan
SWMP	surface water management plan
USGS	U.S. Geological Survey



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## 1.0 INTRODUCTION

The surface water remedy for Butte Priority Soils Operable Unit (BPSOU) is described in the Record of Decision (ROD), which is comprised of the 2006 Record of Decision, the 2011 Explanation of Significant Differences and the 2020 ROD Amendment. The requirements for implementation of the surface water remedy are described in the BPSOU Statement of Work (SOW), Appendix D to the BPSOU Consent Decree (CD), including its attachments. This BPSOU Surface Water Management Plan (BPSOU SWMP or SWMP) describes how the surface water remedy will be managed following construction of all surface water-related remedy elements. The SWMP is the overarching plan for how to address all surface water monitoring activities identified in the ROD that are required under the BPSOU SOW to evaluate the effectiveness of both the surface water and groundwater remedies.

The primary topics addressed by this SWMP include monitoring and management of surface water and sediments<sup>2</sup> and monitoring of benthic macroinvertebrates. The SWMP does not address the implementation and construction of work elements. In the event of any conflict between this document and the BPSOU SOW and its Attachments A, B.1, C and D, the terms of the BPSOU SOW and its attachments control.

The procedures and specific monitoring requirements are included in a separate Surface Water Monitoring Quality Assurance Project Plan (QAPP) (Atlantic Richfield 2018a) and compliance data assessment methodologies are specified in the BPSOU Surface Water Compliance Determination Plan (SWCDP) to which this document is attached as Exhibit 1. Future revisions to the Surface Water Monitoring QAPP will include procedures specific for sediment and benthic macroinvertebrates (BMI) monitoring and data collection. The SWCDP provides detail regarding comparison to in-stream surface water Performance Standards, compliance standard determinations, use of replacement standards, and compliance determination for BPSOU.

This SWMP provides preliminary guidance for design and operation of the various remedial elements related to surface water, particularly the stormwater detention/retention basins and appurtenances and evaluating the performance of the contaminated groundwater collection and treatment systems. While the O&M plans specific to each constructed element guide the day-to-day O&M, the primary purpose of the O&M sections of the SWMP is to describe when operational adjustments to these systems are needed.

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<sup>2</sup> Sediments as used in this document is defined to mean instream sediments in BTC and SBC below the confluence.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

The objectives of this SWMP are as follows:

- Summarize the surface water monitoring that is more specifically described in the Surface Water Monitoring QAPP that will provide data necessary for comparison with Performance Standards.
- Summarize the assessment requirements of the SWCDP, which specify the methodology to determine when the ROD in-stream surface water Performance Standards are exceeded.
- Determine, using relevant lines of evidence, if contaminated groundwater is being adequately controlled to prevent adverse impacts to surface water and/or sediment.
- Summarize the contingency requirements of the SWCDP, which specify when further investigations and/or activities (including additional removal of contaminated sediment and additional contaminated groundwater control) within the scope of the remedy may be conducted.
- Describe differences in assessment and contingency requirements for the compliance determination period and compliance monitoring period.
- Provide preliminary guidance for design and operation of the surface water-related remedial elements.
- This SWMP may be reviewed from time to time to evaluate its effectiveness. Any modifications to the SWMP must be made in accordance with Paragraph 119 of the CD.

#### **1.1 BPSOU SWMP Scope and Organization**

Surface water, groundwater, sediment, and/or benthic macroinvertebrate (BMI) and other potential monitoring data will be used to assess the protectiveness of the Remedy and determine when certain in-stream surface water Performance Standards and sediment criteria are exceeded. In-stream surface water Performance Standards are listed in the SWCDP. EPA, in consultation with DEQ, will use the processes outlined in this SWMP to determine when additional contaminated sediment removal and/or additional control of contaminated groundwater is required. Sediment criteria (Probable Effects Concentrations [PEC]) and other processes are defined in Section 8.1 of this SWMP.

SWMP components include:

- Section 2 – Surface Water Site Features
- Section 3 – Surface Water Remedy Description
- Section 4 – Surface Water Monitoring
- Section 5 – Sediment Performance Monitoring



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- Section 6 – Benthic Macroinvertebrate Monitoring
- Section 7 – Surface Water Monitoring Data Evaluation
- Section 8 – Sediment and Benthic Macroinvertebrate Data Evaluation
- Section 9 – Surface Water Diagnostic Response Evaluation
- Section 10 – Sediment Diagnostic Response
- Section 11 – Butte Treatment Lagoons
- Section 12 – Operational Guidelines for Remedy O&M Affecting Surface Water and/or Sediments
- Section 13 – Project Management and Reporting
- Section 14 – References



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **2.0 SURFACE WATER SITE FEATURES**

Blacktail Creek (BTC) is the primary upstream water body that flows into BPSOU. A minor perennial tributary, Grove Gulch, joins BTC at the BPSOU boundary. Silver Bow Creek (SBC) within BPSOU is comprised of two distinct portions. One is upstream of the confluence with BTC, which is a constructed channel with no perennial base flow. The remaining portion of SBC is downstream of the confluence with BTC and includes all of the input flow from BTC.

BPSOU is an urbanized area with constructed stormwater features to control and direct urban runoff. Several stormwater outlets discharge into SBC upstream of the confluence with BTC. Additional outlets discharge directly to SBC downstream of the confluence with BTC.

BTC, SBC, and drainages flowing to the two creeks within the BPSOU have been sampled extensively since the late 1990s during both normal flow and wet weather conditions for contaminants of concern (COCs) and other water quality parameters. Data collected in the 1980s and early 1990s demonstrated elevated COC concentrations in SBC during normal flow and storm flow conditions. Seasonal high flows fed by spring snowmelt and periodic wet weather events result in higher suspended sediment and increased total recoverable COC concentrations. As a result, State of Montana total recoverable COC standards are routinely exceeded in BTC and SBC during seasonal high flows and storm events. However, federal dissolved surface water Performance Standards are only occasionally exceeded. During normal flow conditions, COC and suspended sediment concentrations are low, water hardness concentrations are higher, and exceedances of aquatic life water quality standards are less frequent. Contaminated groundwater discharging to BTC and SBC surface water was and continues to be a source of contamination to surface water and sediments that will be further controlled by the implementation of the remedy as described in the BPSOU SOW.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

### 3.0 SURFACE WATER REMEDY DESCRIPTION

The surface water remedial action objectives (RAOs) specified in the 2006 Record of Decision as modified by the 2020 Record of Decision Amendment are as follows, with 2020 Record of Decision Amendment changes italicized:

- Prevent ingestion or direct contact with contaminated surface water that would result in an unacceptable risk to human health
- Return surface water to a quality that supports its beneficial uses
- Prevent source areas from releasing contaminants to surface water that would cause the receiving water to violate [surface water applicable or relevant and appropriate requirements] (ARARs) and [remedial goals] (RGs) (*or replacement standards for ARARs that are waived*) for the [operable unit] OU and prevent degradation of downstream surface water sources, including during storm events
- Ensure that point source discharges from any water treatment facility (e.g., water treatment plant, wetland, etc.) meet ARARs
- Prevent further degradation of surface water
- Meet *or appropriately waive and replace* the more restrictive of chronic aquatic life or human health standards for surface water identified in Circular DEQ-7 (Table 8-2 [in the ROD]) through the application of B-1 class standards

Additional RAOs for groundwater and solid media, which affect surface water and sediment, include:

- Prevent groundwater discharge that would lead to violations of surface water ARARs and RGs for the BPSOU
- Prevent releases of contaminated solid media to the extent that they will not result in an unacceptable risk to aquatic environmental receptors
- Prevent releases of contaminated water from solid media that would result in exceedances of the Montana State Water Quality Standards *or their replacement standards* for surface water
- Remediate contaminated solid media to the extent that it will not result in an unacceptable risk to human health and/or aquatic environmental receptors
- Prevent release of contaminated water from solid media that would result in degradation of surface water in accordance with the surface water RGs

Described below are the required remedy components, the already completed remedy work, and the proposed additional remedy work to be completed. Through the completion of all current and required remedy work, RAOs (as described in the ROD and BPSOU SOW) may be achieved.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

### 3.1 2006 Record of Decision Remedy Components

The surface water remedy, described in the 2006 Record of Decision (EPA 2006) is as follows:

1. “The Surface Water Management Program, which utilizes BMPs to address contaminated stormwater runoff and improve stormwater quality.
2. Excavation and removal to a repository of contaminated sediments from the stream bed, banks, and adjacent floodplain along Blacktail Creek and Silver Bow Creek, from just above the confluence of Blacktail Creek and Metro Storm Drain<sup>3</sup> to the beginning of the reconstructed Silver Bow Creek floodplain at Lower Area One. Following removal of the in-stream sediments, further evaluation of surface water quality in this area will be conducted. If groundwater inflow is found to adversely affect surface water quality, additional hydraulic controls and groundwater capture shall be implemented within the BPSOU.
3. Capturing and treating water runoff up to a specified maximum storm event, if BMPs implemented under the Surface Water Management Program do not achieve the goal of meeting surface water standards in Silver Bow Creek, Grove Gulch, and Blacktail Creek during stormwater events<sup>4,5</sup>. [modified by the 2020 Record of Decision Amendment]
4. Hydraulic control, capture, and treatment of contaminated groundwater to prevent its discharge to Silver Bow Creek surface water...”
5. “In-stream flow augmentation as appropriate. Flow augmentation will not be considered until the major remedial components described in this ROD are designed and implemented<sup>6</sup>.” [modified by the 2020 Record of Decision Amendment]

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<sup>3</sup> Note that in the 2006 ROD, 2011 Explanation of Significant Differences, and many site technical documents, the terminology used for this BPSOU conveyance feature was “Metro Storm Drain”; however, it is now referred to as “Silver Bow Creek.”

<sup>4</sup> The 2020 ROD Amendment removed the requirement for consideration and potential construction and use of a separate conventional lime treatment facility for stormwater treatment as a component of the BPSOU surface water remedy. The detention/retention basins which will be constructed are considered to be treatment.

<sup>5</sup> The 2020 ROD Amendment changed the points of compliance to two stations in SBC, thereby removing points of compliance in BTC and Grove Gulch.

<sup>6</sup> The 2020 ROD Amendment removed in-stream flow augmentation as a component of the BPSOU surface water remedy.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

Items 3 and 5 were modified by the 2020 Record of Decision Amendment as described in the footnotes.

The initial surface water management program, as described in the 2006 Record of Decision, employed an adaptive management approach to meeting surface water RAOs where surface water monitoring, compliance analysis, and loading analysis were used to determine the need for and locations of additional best management practices (BMPs) while BMP selection and BMP implementation were responses to the identified needs. Construction was to be followed by monitoring to complete the cycle. The cycle of monitor, analyze, design, and implement was to continue until RAOs are met or up to 15 years.

The 2006 Record of Decision groundwater remedy as related to surface water includes:

- Capture and treatment of contaminated groundwater between the confluence of BTC and SBC and the Civic Center area
- Capture and treatment of contaminated groundwater in Lower Area One (LAO)
- A contingency for expanding contaminated groundwater capture as needed to prevent adverse effects on surface water quality
- The 2006 Record of Decision non-residential solid media remedy related to surface water includes:
- Reclamation of source areas, including mine waste and contaminated soil, to prevent erosion and mobilization of metals to surface water

The ROD Remedy for each of the media also includes monitoring and maintenance.

The 2011 Unilateral Administrative Order for Partial Remedial Design/Remedial Action Implementation and Certain Operation and Maintenance at the Butte Priority Soils Operable Unit (EPA 2011a) did not make changes to the 2006 Record of Decision remedy components related to surface water. However, the BPSOU Partial Remedy Implementation Work Plan (EPA 2011b) clarified that the surface water remedy components were not fully implemented by the Unilateral Administrative Order and the surface water management program would continue through the third cycle.

The 2020 Record of Decision Amendment makes changes to the surface water remedy and expands the groundwater remedy. Changes to the surface water remedy include:

- Waiver and replacement of two in-stream surface water Performance Standards



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- Additional automatic waivers if certain other Performance Standards are not met during the Performance Standards determination period
- Eliminating certain surface water points of compliance
- Simplifying the method for determining upstream COC concentrations
- Revising the definition of the wet weather flow regime
- Providing specificity for the fourth and final cycle of the surface water management program
- Expanding the previously required sediment removal, including relocating a reach of SBC, and floodplain removal requirements
- Remove the contingency to install a conventional treatment plant for chemical treatment of stormwater
- Remove the option for augmentation of flow to obtain remedial goals

Changes to the groundwater remedy include:

- Implementing the contingency for expansion of groundwater collection to reduce adverse effects on surface water quality within BPSOU
- Additional removals of historical mine waste in certain areas

### **3.2 Completed Remedy Work**

A summary of the status of ongoing remedy implementation is included in Attachments B and B.1 to the BPSOU SOW for the BPSOU CD.

### **3.3 Further Remedial Elements**

Attachment C to the BPSOU SOW identifies nine remedial elements to be implemented pursuant to the CD. Detailed descriptions of these aspects of the remedy are provided in the Further Remedial Elements Scope of Work, Attachment C to the BPSOU SOW. The surface water monitoring portion of the remedy is described in Section 4, below.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

#### **4.0 SURFACE WATER MONITORING**

During prior activities to implement the remedy, surface water monitoring has been conducted as part of the surface water management program with the purposes of assessing compliance with Performance Standards set forth in the ROD and to determine where additional remedial work may be needed to fully comply with standards. Following construction of remedial components, surface water monitoring will include compliance monitoring intended to measure compliance with Performance Standards and performance monitoring intended to provide information for O&M and the overall performance of the remedy. Compliance monitoring will be conducted in accordance with the SWCDP.

Monitoring required under the surface water management program evaluates wet weather conditions where stormwater BMPs are the primary remedial elements and normal flow conditions where discharge of groundwater or controlled releases from detention/retention basins or other sources may improve or adversely affect surface water. Monitoring during these conditions measures progress toward achieving the primary objectives for surface water by determining compliance with in-stream surface water Performance Standards.

Prior to completing remedy implementation, the focus of surface water monitoring has been for diagnostic purposes, focused on identifying loading sources that further remedy implementation can address. With the completion of the Further Remedial Elements Scope of Work, assessment of compliance with standards will become formalized and include responses that will be taken upon exceedance of Performance Standards at specific points of compliance.

Surface water compliance monitoring is described in Section 2 of the SWCDP. Routine surface water monitoring is conducted following the Surface Water Monitoring QAPP, which implements the requirements of the SWMP and SWCDP and includes requirements for performance monitoring. The Surface Water Monitoring QAPP is updated each year, if necessary, to reflect potential changes such as minor revisions to locations and schedule subject to review and approval by EPA in consultation with the Montana Department of Environmental Quality (DEQ). The Surface Water Monitoring QAPP includes detailed information for implementing surface water monitoring such as sample locations, schedules, analytical requirements, and quality assurance (QA) procedures. Monitoring is generally conducted during normal flow conditions, with in-stream results compared to chronic Performance Standards, and during wet weather conditions, with the results compared to acute Performance Standards. During non-winter periods, additional monitoring is conducted at locations where stormwater may discharge to surface water, including at outlets of the stormwater system and within the remedial elements. These data are informative for evaluating remedy performance but are not used for compliance assessment.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

The Surface Water Monitoring QAPP provides details for collecting data necessary to:

- Evaluate compliance with Performance Standards at the points of compliance (i.e., compliance monitoring);
- Evaluate performance of the remedy in accomplishing the primary objectives of returning SBC to its beneficial uses and protecting downstream receptors from releases of contamination from BPSOU (i.e., performance monitoring); and
- Evaluate any necessary diagnostic data collected for the purpose of identifying any remedial system component optimization or maintenance, including additional removal of contaminated sediments or additional contaminated groundwater control.

To address these needs, the Surface Water Monitoring QAPP governs data collection at specific locations under two different stream conditions. These are described in the following sections.

#### **4.1 Wet Weather Conditions**

##### **4.1.1 Wet Weather Definition and Sampling Trigger**

The surface water management program assesses whether in-stream Performance Standards are being met during wet weather conditions. In accordance with the SWCDP (Attachment A to the BPSOU SOW), the definition of wet weather and the trigger for collecting surface water compliance samples is when there is measurable outflow from the primary outlet of the following main stormwater detention/retention basins within BPSOU: CB-9 in Missoula Gulch, the Diggings East basin, and the Buffalo Gulch basin. This trigger will continue to be used for collection of performance samples for informational and assessment purposes.

In a general sense, wet weather conditions are short-term rain or snowmelt events when changes in flow and water quality occur over a short period. Surface water performance monitoring to measure water quality during wet weather conditions involves collecting a series of samples during wet weather events, with sampling initiated by a change in stream stage or at a stormwater discharge outlet. Periodic surface water performance samples will be collected when measurable outflow occurs from any stormwater detention/retention basins to inform remedy operations. Wet weather performance samples will be collected based on significant increases in stream stage due to basin discharge, with decreasing frequency over time.

*“Measurable outflow”* means sufficient flow that the rate can be measured using a flume, weir, meter, or other mechanical device. In a practical sense,



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

this is intended to include the flow of water that reaches surface water and is not de minimis.

*“Primary outlet”* means the top (maximum elevation) of the outlet control structure established to detain/retain the entire specified design storm of each respective main basin (see Figure 5-1). The primary outlet is not the emergency spillway.

#### **4.1.2 Wet Weather Performance Monitoring**

Performance monitoring during wet weather events including stage, flow, and water quality, will be conducted at in-stream and stormwater facility locations historically monitored under the previous interim surface water monitoring plan and current Surface Water Monitoring QAPP. The purpose in maintaining these stations is to evaluate the effectiveness of the remedy at reducing COC loading to surface water. Previous in-stream stations to be retained, revised or relocated may include SS-01, GG-BTC, SS-04, SS-05, SS-05A, SS-06A, SS-06G, and SS-07. Stations may need to be moved or sampling temporarily discontinued to allow for construction activities. In the case of stream channel relocation, affected stations will be discontinued and new stations will be established as a part of the RAs. In-stream sampling will be conducted using automated samplers to collect multiple samples over the hydrologic event cycle. Samplers will be triggered based on increases in stage that are specific to each location and season as defined in the Surface Water Monitoring QAPP.

Stormwater monitoring of locations not in perennial streams primarily includes outlets of the municipal stormwater system. These are currently referred to in the Surface Water Monitoring QAPP as diagnostic monitoring locations and provide information for characterizing stormwater that will report to the detention/retention basins already existing or to be constructed. Fifteen locations are included in the current Surface Water Monitoring QAPP, and some will continue to be sampled as needed to inform the shakedown process, operations, and/or diagnostic investigations. Most of the stormwater system locations employ automated samplers triggered by changes in stage. The remaining locations employ crest samplers triggered by a stage set by field personnel. This system will continue but may be modified as needed. After the detention/retention basins are constructed and deemed operational and functional, the performance monitoring of the stormwater system will be revised to include monitoring inlets and outlets of the detention/retention basins and other locations within BPSOU as necessary to evaluate the effectiveness of the remedy. The frequency and intensity of performance



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

sampling will reduce over time and be periodically reviewed and modified as appropriate.

When the surface water remedy is fully implemented, performance monitoring of the components outside of the perennial streams will occur as needed. Further description of this performance monitoring shall be completed during RD. Calculation of the initial discharge rates from the main basins will be made during RD. The purpose of this monitoring is to measure the effectiveness of the basins at reducing COC concentrations, to determine appropriate seasonal discharge rates from the basins to surface water and to provide data to evaluate the need for operational adjustments. However, occasional in-season adjustments are not precluded. Monitoring will include flow and water quality. Monitoring needs upstream in the stormwater system of the detention/retention basins will be determined as a part of development of the O&M plan for the basins; however, the shakedown stage of basin operation will require significant performance monitoring to be able to adjust discharge rates from the pond outlets.

#### **4.2 Normal Flow Conditions**

##### **4.2.1 Normal Flow Definition and Compliance Sampling Trigger**

Normal flow conditions, as defined in the SWCDP (Attachment A to the BPSOU SOW), include base flow and seasonal high flow when flow rates are not significantly changing and conditions are mostly stable, including normal diel flow variation. Normal flow compliance sampling is triggered by schedule and occurs only when the basins are not discharging as further described in the Surface Water Monitoring QAPP. Compliance sampling during normal flow conditions occurs eight times per year, with four sampling events during base flow conditions and four sampling events during normal high flow conditions, which will be defined in the Surface Water Monitoring QAPP consistent with methodologies employed by the U.S. Geological Survey.

##### **4.2.2 Normal Flow Performance Monitoring**

Performance monitoring of normal flow will be conducted periodically to measure effects of discharging treated stormwater or uncontrolled contaminated groundwater discharge to surface water.

Normal flow performance samples will be collected to evaluate appropriate seasonal discharge rates from the basins. Normal flow performance sampling is not restricted by hydrologic changes or whether basins are discharging.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

Normal flow sampling occurs at in-stream locations and at selected point source discharges. Monitoring will include manually collecting stage flow and water quality data. In-stream performance samples will be periodically collected at stations SS-01, SS-01.6, SS-04, SS-05, SS-05.7, SS-05A, SS-06A, SS-06G and SS-07 with modifications to this list detailed in the QAPP, subject to approval by EPA, in consultation with DEQ. Performance samples may be collected at other locations as needed to inform diagnostic investigations. Compliance samples will be collected at SS0-06G and SS-07. Compliance assessment samples will be collected at upstream station SS-01. Stations may need to be moved or sampling temporarily discontinued to allow for construction activities. In the case of stream channel relocation, affected stations will be discontinued and new stations may be established as a part of the RAs. Basin performance monitoring is conducted to measure the effectiveness of the stormwater basins and to inform operations, as further defined in the Surface Water Monitoring QAPP.

#### 4.3 Schedule for Implementation

Surface water monitoring is ongoing under an approved Surface Water Monitoring QAPP. The different monitoring periods include:

- Interim Monitoring Period – Includes ongoing monitoring prior to the Effective Date of the CD through the Remedial Design phase;
- Construction and Shakedown Monitoring Period – Includes performance monitoring commencing with the construction of remedial elements and continuing through construction and shakedown of the basins; this monitoring will be completed upon KRECCR approval by EPA, in consultation with DEQ;
- Compliance Standard Determination Period – Upon KRECCR approval (and in addition to compliance monitoring conducted in accordance with the SWCDP) performance monitoring will continue to refine operation of the basins and inform diagnostic investigations; and
- Compliance Monitoring Period – Upon the Compliance Standard Determination (and in addition to compliance monitoring conducted in accordance with the SWCDP), limited performance monitoring will continue to inform long-term operations and maintenance of the stormwater BMPs.

Further descriptions of the compliance monitoring periods are included in Figure 1-1 of the SWCDP.

#### 4.4 Monitoring Methodologies

In-stream surface water compliance samples shall be analyzed for all COCs, both total recoverable and dissolved, plus hardness and applicable parameters that are



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

needed to apply the Biotic Ligand Model to normal flow and stormwater samples. Additional sampling parameters include field measurements (e.g., pH, temperature, specific conductance, oxidation-reduction potential) and hydrologic measurements (e.g., stage, discharge). Performance monitoring requirements are flexible and will be determined based upon the purpose of the monitoring. Sampling protocols are set forth in the final BPSOU Surface Water Monitoring QAPP and in the Clark Fork River Superfund Site Investigations Quality Assurance Project Plan and any amendments thereto. Certain methodologies are specified for compliance samples in the SWCDP.

#### **4.5 Data Reporting**

Consistent with the BPSOU SOW, a data summary report (DSR) for the sitewide surface water monitoring program shall be prepared annually for submittal in May to EPA and DEQ. DSR reports shall follow the general format of the pilot data report addendum (ARCO 2000) or an approved replacement format and shall be submitted in draft and are subject to comment by EPA in consultation with DEQ. Quarterly data reports, without full QA/quality control (QC) information, shall also be provided by the SDs to EPA and DEQ. However, the SDs shall complete validation of laboratory data throughout the year to ensure that the laboratory data meet the QA/QC requirements. Further details regarding data validation and reporting are contained in the Surface Water Monitoring QAPP.

The SWCDP identifies the methodology for determining exceedances of the surface water Performance Standards for the BPSOU. The SWCDP controls if there is any inconsistency between the SWCDP and the SWMP.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## 5.0 SEDIMENT PERFORMANCE MONITORING

Sediment performance monitoring is to begin upon construction completion of certain Further Remedial Elements. A more detailed description of the sediment performance monitoring will be described in the Surface Water Monitoring QAPP. Data obtained from sediment performance monitoring is intended to inform stakeholders if the remedy is protective of SBC and BTC or if recontamination of sediments is occurring as a result of upstream loading by surface water transport and deposition of COCs or by loading to sediments from a groundwater source(s) contaminated by historical mine waste. The decision process as to whether further sediment removal and/or additional contaminated groundwater control will be required under the remedy is described in Section 10 of this SWMP.

Annual sediment sampling is to occur at sampling locations within BPSOU and upstream of BPSOU. Sampling and analysis will be generally consistent with monitoring conducted at the Streamside Tailings Operable Unit (SSTOU), including coordination of sampling dates, if possible. Collected samples shall be segregated by depth interval (e.g., 0-2 inches, 2-6 inches, and 6-12 inches as described in the and sieved to a diameter less than 2mm (Surface Water Monitoring QAPP)). Each sample shall be analyzed for pH, arsenic, cadmium, copper, lead, mercury, and zinc and any additional analytes listed in the Surface Water Monitoring QAPP. The Surface Water Monitoring QAPP provides a detailed description of the sampling locations and collection techniques and is generally consistent with the sediment sections of the *Comprehensive long-term monitoring plan for Silver Bow Creek Streamside Tailings Operable Unit*, (DEQ and NRDP, 2004) and *Sampling and analysis plan for performance monitoring of the Streamside Tailings Operable Unit – 2016* (DEQ and NRDP, 2016).

Section 8 of this SWMP provides a description of how the sediment data will be considered in determining whether any additional response actions are recommended.

### 5.1 Data Reporting

A Surface Water DSR for the sediment performance monitoring program shall be prepared annually for submittal in May to EPA and DEQ. DSR reports shall follow the general format of the pilot data report addendum, shall be submitted in draft, and are subject to comment by EPA in consultation with DEQ. Further details regarding data validation and reporting are contained in the QAPP.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **6.0 BENTHIC MACROINVERTEBRATE MONITORING**

This section generally describes the BMI monitoring, which is to occur during the BPSOU compliance determination period and compliance monitoring period. The results of BMI monitoring will be considered as a line of evidence along with all other data sources to inform further remedial actions and during the 5-year review as part of assessing the protectiveness of the remedy. A more detailed description of BMI monitoring will be described in the Surface Water Monitoring QAPP.

### **6.1 Data Reporting**

The BMI monitoring data shall be prepared and reported in the annual Surface Water DSR for submittal to EPA and DEQ annually in May. BMI monitoring is dissimilar enough from other media that the standard requirements for validation and reports do not apply. This portion of the Surface Water DSR shall present any QA data and an assessment of the data quality objectives. Reports shall be submitted in draft and are subject to comment by EPA in consultation with DEQ.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **7.0 SURFACE WATER MONITORING DATA EVALUATION**

Compliance and performance surface water data shall be evaluated to determine recommendations, if any, for additional response actions or operational adjustments, respectively. Figure 1-1 of the SWCDP depicts the compliance determination and compliance monitoring periods following agency approval of the KRECCR. Methods for evaluation of surface water compliance data and potential response actions related to surface water are established in the SWCDP. Methods for evaluation of surface water performance data and potential operational changes related to surface water and for other media are described herein.

Both compliance and performance data require review and potential calculations and adjustment prior to comparison to Performance Standards as described in the SWCDP.

Sections 7.1 and 7.2 identify the various compliance and performance data evaluations to be completed to answer the questions found in the additional work decision flow chart found in Figure 7-1 of the SWCDP and as described in the SWCDP.

### **7.1 Compliance Data Evaluations**

Compliance samples will be evaluated in accordance with the SWCDP. Compliance samples that exceed instream surface water Performance Standards are referred to as “exceedances” in this SWMP.

### **7.2 Performance Data Evaluations**

Performance data will be used to inform operational adjustments to the remedy. Performance data may also be used to inform diagnostic investigation and subsequent diagnostic response. Samples obtained during performance monitoring that exceed Performance Standards will be considered a surface water deviation. Surface water deviations can drive operational adjustments to then existing groundwater controls or surface water BMPs, but are not counted as exceedances for compliance purposes and do not lead to violations, waivers or additional work.

### **7.3 Surface Water Compliance Comparison and Interpretation Report**

As described in the BPSOU SOW and its attachments, comparison of surface water quality to instream surface water quality Performance Standards shall be prepared and submitted annually by the SDs in the Surface Water Compliance Comparison and Interpretation Report. This is separate from the Surface Water DSR. The report will include validated COC results from all perennial surface water stations for the calendar year categorized by compliance samples and performance samples. Results will be presented with comparisons to instream surface water quality Performance Standards and as detailed in the SWCDP, and a total number of exceedances and surface water deviations, if any, will be derived (per COC) and presented. A running



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

total of previous exceedances and surface water deviations will also be presented. The report may include interpretation of data collected under the Surface Water Monitoring QAPP. The report shall be submitted by June 30<sup>th</sup> each year in draft for EPA comment in consultation with DEQ. Upon satisfactorily addressing agency comments, the report will be finalized.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **8.0 SEDIMENT AND BENTHIC MACROINVERTEBRATE MONITORING DATA EVALUATION**

### **8.1 Sediment Data Evaluation**

The data presented in the Surface Water DSR will be evaluated to assess the performance of the surface and groundwater remedies as described in this document.

Performance Standards for sediment have not been established for BPSOU. Comparison of sediment concentrations to the Probable Effects Concentrations (PECs) will be used by EPA, in consultation with DEQ, to determine if further investigation is required per Figure 10-1. PECs were established as concentrations of individual chemicals above which adverse effects in sediments are expected to frequently occur (Ingersoll *et al.* 2000, MacDonald *et al.* 2000). The PECs are listed in Table 8-1.

If the sediment sample concentration is greater than the PECs in Table 8-1, the laboratory duplicate of digestate liquor will be analyzed. The relative percent difference (RPD) between the natural sample and laboratory duplicate sample will be calculated. If the RPD is greater than 20 percent, the natural sample is flagged J, and the result is screening quality and no sediment deviation has occurred, and resampling will occur. If the RPD is 20 percent or less, data validation will be performed. If the sample result is enforcement quality and exceeds PEC, a sediment deviation has occurred. The comparison to sediment criteria process is shown on Figure 8-1. Sediment deviations and how they will be used in a diagnostic way for assessing recontamination are addressed in Section 10.

Additionally, sediment data will be evaluated for trends by depth interval. Trends will be evaluated using the procedures developed by EPA for groundwater monitoring and are described later in terms of frequency of monitoring and direction of the trend. An EPA spreadsheet for conducting this evaluation is found at <https://www.epa.gov/superfund/superfund-groundwater-groundwater-response-completion> i.e., Groundwater Statistics Tool (Version 2).

The spreadsheet offers two options for the type of tests to be completed. The “Remediation” tests are to be selected. Where the data are normally distributed, trends will be evaluated using the ordinary least squares method. Where the data are lognormally distributed, trend analysis will include a Mann-Kendal trend analysis and a Theil-Sen slope analysis. The tests will be run using a 95 percent confidence level. A minimum of four consecutive concentrations are needed, but the tests will be run using no more than eight consecutive concentrations when available.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **8.2 Benthic Macroinvertebrate Data Evaluation**

The BMI data will be used in the 5-year review to evaluate overall protectiveness of the remedy, which, if supported by other lines of evidence, may require additional sediment removal. Results of BMI monitoring do not have triggers or benchmarks that lead directly to further action, but will be used, along with all other appropriate data sources, as a line of evidence to inform further response actions as described in Sections 9 and 10.

## **8.3 Sediment Performance Reporting**

Comparison of sediment concentrations to PECs (Table 8-1) and evaluation of BMI data will occur annually by the SDs. This is separate from the DSRs. This report will be included within the Surface Water Compliance Comparison and Interpretation Report, as described in Section 7.3. The report will contain results from the sampling stations from which they were collected for the calendar year. The total number of sediment deviations, if any, will be derived (per COC) and presented. Sediment concentration (by size fraction, if necessary) and BMI data will also be presented. Trends of the data will be included if appropriate data are available. Reports shall be submitted by the SDs annually by June 30th in draft form and are subject to comment by EPA in consultation with DEQ. Final reports are subject to comment, review, and approval by EPA in consultation with DEQ.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **9.0 SURFACE WATER DIAGNOSTIC RESPONSE EVALUATION**

### **9.1 Preliminary Diagnostic Evaluation for a Surface Water Deviation**

If a surface water deviation has occurred during performance monitoring, as described in Section 7.2 of this SWMP, a preliminary diagnostic evaluation will be performed to inform potential operational adjustments to meet the remedial goals listed in Section 3 to the extent practicable. Any operational adjustments proposed for implementation will be documented in a Request for Change (RFC) document. The RFC may be integrated into future revisions of the O&M plan if determined appropriate upon annual review.

A preliminary diagnostic evaluation will be conducted to report on whether the surface water deviation was a result of failure to operate or maintain a surface water-related element or an unavoidable occurrence. An unavoidable occurrence is defined as a condition when a single storm event exceeds the design volume of a main stormwater retention/detention basin or a condition not controlled by the remedy. O&M records and existing data will be reviewed to determine the cause of the deviation. At the conclusion of the evaluation and records and data review, a preliminary diagnostic evaluation report of findings and causation shall be submitted to EPA and DEQ within 60 days of the request or notification. EPA and DEQ will review and, if appropriate, comment on the report.

### **9.2 Diagnostic Response Investigation for an Exceedance**

If a Performance Standard exceedance has occurred during compliance monitoring as described in the SWCDP, the process for determining the response and Additional Work, if any, will be evaluated in accordance with Section 7.1 or Section 7.2 of the SWCDP.

The primary objective of the diagnostic response investigation is to determine the cause of the exceedance, such as failure of a constructed remedial element or variance from the approved O&M plan, and/or determine and characterize the source of the COC leading to the exceedance. Depending on the data and findings presented in the preliminary diagnostic evaluation report, EPA, in consultation with DEQ, may require development of a diagnostic response investigation work plan. The diagnostic response investigation work plan may include a variety of elements such as additional diagnostic monitoring of surface water, groundwater, soil, or sediment; review of O&M procedures; inspection and testing of constructed remedial elements; and/or auditing of data and data collection methods. The scope of the investigation will depend on the nature and severity of the exceedance. For exceedances occurring during normal flow conditions, the investigation will primarily focus on groundwater controls, groundwater conditions, BTL operations, sediments and pore water, and other potential chronic sources. Table 9-1 provides the lines of evidence to be



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

considered by EPA, in consultation with DEQ, to determine if additional groundwater hydraulic control in BPSOU is necessary.

For exceedances occurring during wet weather flow conditions, the investigation will primarily focus on (but not be limited to) wet weather remedial features such as retention/detention basins, BMPs, and other remedial elements within the Corridor, as defined in the SWCDP.

EPA, in consultation with DEQ, will review and comment, as necessary, on the draft plan. Upon satisfactory revision, as needed, EPA, in consultation with DEQ, will approve the final diagnostic response investigation plan. Following completion of data collection and analysis, a draft diagnostic investigation report will be prepared and submitted to EPA and DEQ. The report will provide the findings of the investigation and, as appropriate, include recommendations to correct failures, improve O&M, and/or perform optimization to mitigate the potential for further exceedances. If optimization is recommended, an optimization report shall be prepared (see Section 9.3). EPA, in consultation with DEQ, will review and provide comments on the draft document. Upon satisfactory revision, as needed, EPA, in consultation with DEQ, will approve the final diagnostic investigation report.

The diagnostic investigation report may provide findings or causation in general categories, including O&M, remedy performance (including hydraulic control of contaminated groundwater), external causes such as upstream sources, nonhistorical mine waste sources, or a combination of causes.

### **9.3 Responses and Actions**

Responses or actions following a compliance exceedance or surface water deviation depends on the result of the preliminary diagnostic evaluation report or diagnostic investigation report. Responses or actions following a compliance exceedance are described in Sections 7.1 and 7.2 of the SWCDP. Responses or actions following a surface water deviation are shown on Figure 9-1 and described in this section.

If the exceedance or surface water deviation occurred as a result of an unavoidable occurrence, an inspection of remedy features will be conducted. Any damage or failure of remedy features resulting from the event will be repaired as needed. No further investigation or corrective action is required, and monitoring will continue.

If the preliminary diagnostic evaluation report or diagnostic investigation report identifies failure to conduct or complete O&M activities as required by the O&M plan, as a contributor to the exceedance, O&M deficiencies shall be corrected, and no further action is required.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

If the preliminary diagnostic evaluation report or diagnostic investigation report identifies sources other than a historical mine waste source originating within the BPSOU as a contributor to the exceedance, no corrective action is required for those sources under this Remedy. EPA and/or DEQ may investigate or take actions outside of the CD to address non-historical mine waste sources contributing to surface water quality or sediment degradation.

The preliminary diagnostic evaluation report or diagnostic response investigation report may indicate that the constructed elements of the remedy may be operated in a more effective manner to meet Performance Standards. The response to this finding is to evaluate the operation of the remedial elements and make recommendation for improvements within the preliminary diagnostic evaluation report, diagnostic investigation report, or as an RFC to the O&M plan. Improvements may include adjustment to operations, replacement or improvement of inadequate components of remedial elements (excluding major detention/retention basins), or other adjustments specific to performance of the remedial element. Operational improvements may be needed when components of remedial elements (e.g., conveyances, control structures, etc.) fail in demanding conditions such as storm events near the design event, back to back storm events, high water table conditions, or other uncommon but reasonably anticipated conditions.

If the diagnostic response investigation concludes that optimization or other additional response as described in Section 7 of the SWCDP is necessary and EPA, in consultation with DEQ, concurs with this conclusion, the SDs shall prepare an Optimization Report, which shall describe proposed changes to surface water or groundwater remedial elements and any modified surface water monitoring requirements. The Optimization Report is subject to review and approval by EPA in consultation with DEQ. Following approval of the of the recommendations in the Optimization report, SDs shall prepare draft remedial design plans for implementation of approved optimization or additional response. Upon EPA approval, in consultation with DEQ, of a final remedial design plan and accompanying remedial action plan, SDs shall implement the Work required by these plans.

Following implementation of optimization or other recommendations of the diagnostic response investigation, monitoring will continue.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **10.0 SEDIMENT DIAGNOSTIC RESPONSE**

### **10.1 Preliminary Diagnostic Evaluation for Sediment Deviation**

If a sediment deviation has occurred as determined in Section 8.1, the preliminary diagnostic response will begin the process to identify the source of the deviation. The preliminary diagnostic evaluation will include a site inspection and review of available information to support the preparation of a preliminary diagnostic evaluation report. The response also includes the initiation of quarterly sampling of sediments.

If possible, the preliminary diagnostic evaluation report will determine if the sediment deviation was the result of an unavoidable occurrence, an upstream source, or a failure to conduct remedy O&M activities. Responses to any of these findings are described in Section 10.3 and illustrated on Figure 10-1.

### **10.2 Diagnostic Response Investigation for a Sediment Deviation**

If the preliminary diagnostic evaluation report cannot determine the source of the sediment deviation (i.e., not unavoidable occurrence, upstream source, or O&M failure), a diagnostic response investigation work plan will be developed to collect lines of evidence to allow EPA, in consultation with DEQ, to determine the cause of the sediment deviation. If the preliminary diagnostic evaluation report or diagnostic investigation report, as approved by EPA, in consultation with DEQ, identifies source(s) other than historical mine waste originating within the BPSOU as the primary cause of the deviation, neither corrective action for those sources nor instream sediment removal is required under this Remedy, quarterly sediment monitoring ceases, and annual sediment monitoring resumes. EPA and/or DEQ may investigate or take actions outside of the CD to address non-historical mine waste sources contributing to surface water quality or sediment degradation.

The diagnostic response investigation needs to consider sources and pathways and tailor the investigation to allow EPA, in consultation with DEQ, to determine the source(s) and pathway(s) of recontamination.

Four primary sources and/or pathways could be acting as loading sources of COCs to sediment:

1. Suspended sediment mobilized by stormwater discharge from the stormwater infrastructure and remedial elements within the BPSOU,
2. Contaminated groundwater discharge and subsequent COC adsorption onto sediment,
3. Sediment mobilized from outside BPSOU boundary, or



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

4. From sediment sources not related to historical mine waste.

Preliminary lines of evidence are identified in Table 9-1 for a groundwater source. The investigation will be similar to that described in Section 9.2 for surface water.

In addition to determining the source or cause of the sediment deviation, the diagnostic response investigation for sediment deviations will include collection of data to evaluate the risk to benthic and lotic aquatic receptors posed by the sediment deviation, to recommend if and when the contaminated sediment removal will be performed. BMI data will be used, in conjunction with all other appropriate data, to allow EPA, in consultation with DEQ, to determine if additional sediment removal is necessary. The scope of the investigation will be dependent on the nature of the sediment deviation and the results of the preliminary diagnostic investigation. It is anticipated that the diagnostic response investigation may include sediment pore water quality collection, adjacent groundwater quality and flow regime data collection and assessment, benthic macroinvertebrate community assessment, macroinvertebrate bioassays, sediment bioavailability testing, and/or body burden analysis of benthic and lotic resident organisms. The investigation will consider various lines of evidence necessary to recommend if additional sediment removal response action is necessary. EPA, in consultation with DEQ, will review and comment, as necessary, on the draft plan. Upon satisfactory revision, as needed, EPA, in consultation with DEQ, will approve the final diagnostic response investigation plan.

Following completion of data collection and analysis, a draft diagnostic investigation report will be prepared and submitted to EPA and DEQ. All pertinent and available data will be incorporated into a draft sediment deviation diagnostic response investigation report.

### **10.3 Responses and Actions**

Responses or actions following a sediment deviation depends on the result of the preliminary sediment diagnostic evaluation report or sediment diagnostic response investigation report. If EPA, in consultation with DEQ, determines that the cause is upstream sources or sources not related to historical mine waste originating within the BPSOU, no further action is required and annual sediment monitoring resumes. All responses or actions must be approved by EPA, in consultation with DEQ. The sediment diagnostic investigation and responses are summarized on Figures 10-1 and 10-2.

#### **Preliminary Diagnostic Investigation Findings:**



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

If the sediment deviation has occurred as a result of an unavoidable occurrence, no additional work is required; however, an inspection of the remedy features will be conducted. Any damage or failure of remedy features resulting from the unavoidable occurrence will be repaired as needed. Quarterly monitoring will continue until the PEC is not exceeded or as otherwise determined by EPA in consultation with DEQ that quarterly monitoring is not necessary. The need for contaminated sediment removal due to unavoidable occurrences is evaluated in accordance with Section 10.4.

If the sediment deviation has occurred as a result of a remedy and/or O&M failure, the response will be dependent on the cause. If the deviation is caused by:

- O&M plan not followed, the response would be to follow the O&M procedures;
- O&M procedures not adequate, the response would be to revise the O&M plan; and/or
- Failure of physical Remedy feature, the response would be to repair, replace, and or rebuild features as necessary.

Quarterly monitoring will continue until the PEC is not exceeded or as otherwise determined by EPA in consultation with DEQ that quarterly monitoring is not necessary, and as illustrated on Figure 10-1 and 10-2.

**Sediment Diagnostic Response Investigation Findings:**

If the sediment deviation has occurred as a result of recontamination from historic mine waste impacted stormwater, contaminated groundwater, or failure of a Remedy feature, the response will be dependent on the cause. If the cause of the sediment deviation is determined by EPA, in consultation with DEQ, to be:

- Recontamination from stormwater runoff, the response would be to perform operational adjustments; and
- Inadequate groundwater control based on lines of evidence and concentration trends indicate that PECs will continue to be exceeded, the response would be to complete additional work per CD Paragraph 27, and in accordance with Section 1.3 of the BPSOU SOW (regardless of whether an instream surface water exceedance has occurred). Additional work could include optimization, extension, and/or additional contaminated groundwater control systems; and
- Failure of physical remedy feature, the response would be to repair, replace, and/or rebuild features as necessary; and/or



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- None of the causes above have been observed and the Remedy is performing as designed, no further action is required and annual monitoring resumes.

The biological and toxicological data collected during the diagnostic investigation will be considered, along with any other applicable data, including that related to BMI, to evaluate the impacts to biota. If the evaluation indicates that sediment concentrations are not protective of aquatic health, and PECs are exceeded for multiple quarters in close proximity, additional sediment removal may be required by EPA, in consultation with DEQ, see Figure 10-2.

The SDs shall prepare draft remedial design plans for implementation of approved recommendations or optimizations. Designs for further work are subject to review and comment and potential approval of revised design documents by EPA in consultation with DEQ. Upon EPA approval, in consultation with DEQ, of a final remedial design plan and accompanying remedial action plan, SDs shall implement the Work required by these plans. Implementation of recommendations shall be documented through CCRs as required.

Upon submittal of a diagnostic report containing recommendations for a response action as part of the initial remedial action or consistent with Section 1.3 of the BPSOU SOW, EPA, in consultation with DEQ, will review and may provide comments on the report. Upon satisfactory incorporation of comments and finalization of the report and EPA concurrence, in consultation with DEQ, with the recommendations, design of response actions may proceed. In the event, EPA in consultation with DEQ, does not agree with the findings or recommendations in the report, EPA, in consultation with DEQ, will provide response action requirements consistent with the remedy for design and implementation, though the SDs can dispute in accordance with Sections 7.1 and 7.2 of the SWCDP.

#### **10.4 Determining if Additional Sediment Removals are Required**

Quarterly sediment sampling will continue if the source is due to a single storm event that exceeds the design volume of a main stormwater retention/detention basin. EPA, in consultation with DEQ, will evaluate all available data to determine if additional sediment removal is needed. If the evaluation indicates that sediment concentrations are not protective of aquatic health, and PECs are exceeded for multiple quarters, additional sediment removal may be required by EPA, in consultation with DEQ. Investigations conducted in accordance with Section 10.3 and evaluations conducted under this Section 10.4 only apply to sediment deviations caused by historical mine waste originating within the BPSOU, an unavoidable occurrence that results from a condition when a single storm event exceeds the design volume of a main stormwater retention/detention basin, or an O&M failure. If the cause of the sediment deviation



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

was from a historical mine waste originating within the BPSOU and the source has been addressed but the lines of evidence indicate that sediment concentrations are, or soon will be less than the PECs, no removal action is needed.

If the cause of the PEC deviation has been addressed, but the sediment has not attained COC concentrations less than the PECs within eight quarters, trends shall be evaluated following the methodology specified in Section 8.1. If the trend analysis indicates that PECs might be attained within 2 years, quarterly monitoring shall be continued, and data evaluation will be conducted after each quarter until PECs are attained. If the trend analysis indicates that the PECs will not be attained within 2 years, EPA, in consultation with DEQ, will review all available data, including any benthic macroinvertebrate data to consider short-term and long-term risks of removal or retention of sediment and may revert to annual monitoring or require removal of sediment after which monitoring can revert to annually. Figure 10-2 illustrates the decision process for sediment response.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**11.0 BUTTE TREATMENT LAGOONS**

Compliance standards for the BTL effluent discharge to SBC are detailed in Section 8.0 of the SWCDP. The SWCDP addresses potential extension of the BTL shakedown period, BTL upset conditions, and compliance standards for the BTL (see SWCDP Sections 1 and 8).



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **12.0 OPERATIONAL GUIDELINES FOR REMEDY O&M AFFECTING SURFACE WATER AND/OR SEDIMENTS**

Certain constructed remedy elements require O&M and have or will have specific O&M plans. This section provides guidelines for operations that affect or have the potential to affect surface water quality. The purpose of these guidelines is to describe operational priorities to operate the systems with the intent of attaining the overall goal of the remedy.

### **12.1 Detention/Retention Basins**

The primary goal of the detention/retention basins is to meet surface water quality standards and remedial goals. Operation of the basins will consider two distinct methods to achieve the primary goal: 1) treat collected stormwater through passive settling of sediments and 2) manage discharge of water to minimize adverse impacts to surface water to the extent practicable. Both operational methods will be considered to reduce concentrations of COCs in surface water at the site. Treatment and discharge management will be balanced with the need to prevent unintended impacts to both the stream and to the basins themselves to meet surface water quality standards and remedial goals. General operational guidance will be obtained from *Stormwater Best Management Practice Design Guide*, (Volumes 1 and 3), (EPA 2004) and others as determined applicable during remedial design activities.

The outlet configuration may be adjusted on a seasonal basis such that exceedances of Performance Standards in surface water are minimized to the extent practicable. However, occasional in-season adjustments are not precluded. Typical or expected instream water quality and flow rates in the receiving water will be considered in determining operational adjustments to seasonal discharge rates from the basins. The rate of discharge will be balanced against other demands such as potential impacts from thermal increases, creating capacity for impending storms, etc. (i.e., balancing criteria).

Discharge from the detention/retention basins can occur in two ways: via the emergency overflow spillway in an uncontrolled manner or via the discharge structure in a measured and controlled manner. Uncontrolled overflow will be minimized by managing the basins in a way that provides storage for subsequent storm events.

USGS station 12323240 (collocated with SS-04) provides the stream flow rate in BTC on a 15-minute interval. This provides near real-time data. If determined to be appropriate during design, similar systems will be constructed at each basin, and all data will be compiled and used in a supervisory control and data acquisition (SCADA) system or similar method to allow for recording and management of the data. A telemetry system may also be considered and used to trip the upstream



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

sampler upon basin discharge if the upstream sampler was not already tripped by a change in stage. Any automated monitoring system should be consistent with the BPSOU SOW Section 1.3(d)(2(iii)).

## **12.2 Contaminated Groundwater Hydraulic Control and Treatment Systems**

The primary goal of contaminated groundwater hydraulic control and treatment is to prevent exceedances of Performance Standards in surface water and to limit loading of COCs to sediments within the BPSOU. Lines of evidence, including groundwater hydraulic gradient, groundwater concentrations, surface water concentrations and sediment concentrations will be used to evaluate performance of the groundwater remedy and potential diagnostic responses throughout BPSOU.

Monitoring of groundwater elevations and quality; monitoring of surface water quality and stage; and, monitoring of COCs in sediment will provide data used to evaluate the effectiveness of the groundwater hydraulic control systems. Routine monitoring of the BTL effluent will be used to evaluate effectiveness of the treatment system. If evaluation of data indicates that discharge of contaminated groundwater to surface water is adversely affecting surface water or sediment quality, as described in this SWMP, EPA, in consultation with DEQ, will determine whether operational adjustments or optimization of the remedy is required.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

### 13.0 PROJECT MANAGEMENT AND REPORTING

The BPSOU SOW and the CD provide the primary project management plan for implementing this SWMP, including identifying roles and responsibilities, reporting, and recordkeeping, conducting meetings and maintaining communication; coordinating with other activities, and project completion. This section provides a summary of requirements specific to the activities in this SWMP.

The SDs are responsible for implementation and execution of this SWMP. The SDs will retain a contractor to collect surface water, groundwater, and sediment data and to complete BMI monitoring. The surface water, groundwater, sediment, and BMI data will be maintained by Atlantic Richfield Company in accordance with the BPSOU data management plan (Atlantic Richfield 2018b). SDs will submit data summary reports to the agencies on an annual basis by April of the following year as detailed in the BPSOU Surface Water Monitoring QAPP.

This SWMP may be reviewed from time to time to evaluate its remaining appropriateness and efficacy during and after the compliance determination period. Revisions may also be needed to more accurately monitor in-stream surface water quality based on the results during this period or recommendations contained in 5-year reviews. Any revisions to the SWMP must be adopted in accordance with Paragraph 119 of the CD. Certain protocols, such as number and timing of samples or analysis of non-COC parameters are covered under the Surface Water Monitoring QAPP, which is updated annually.

Following completion of the compliance standard determination monitoring and compliance standard determination, SDs shall revise this SWMP and rename it to the long-term surface water management plan (LTSWM Plan) and be consistent with the SWCDP. The LTSWM Plan describes the collection and reporting of monitoring data that will be utilized to, among other things, assess long-term performance of the Key Remedial Elements and other remedy elements, and support five-year reviews.

Long term operation and maintenance plans for the various response actions constructed within the BPSOU shall also be approved by EPA in consultation with DEQ and implemented.

Several reporting requirements accompany this SWMP. For surface water monitoring, the following reports are required and are subject to EPA review and approval, in consultation with DEQ:

1. *Surface Water Monitoring QAPP* – In June 2018, the interim BPSOU surface water monitoring plan was converted by the SDs to a QAPP format (dated April 24, 2018) and approved by EPA in consultation with DEQ. The Surface Water Monitoring QAPP specifies the sampling of compliance and performance stations and diagnostic sampling



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

occurring to address exceedances, deviations or other peculiarities in the surface water data. This QAPP shall be implemented by the SDs and reviewed and updated annually. The update shall include instream sediment and BMI monitoring details to be defined after implementation of BRW and BTC remedy actions.

2. *Schedule for Implementation* – The schedule for implementing the work is provided in the sitewide Surface Water Monitoring QAPP.
3. *Data Summary Reports* – In addition to the reporting requirements contained in Attachment A to the BPSOU SOW, a DSR for the sitewide surface water monitoring program shall be prepared annually by the SDs for submittal to EPA and DEQ. DSRs shall be submitted by the SDs in draft and are subject to comment by EPA in consultation with DEQ. The final DSR is due from the SDs within 60 days of the receipt of EPA comments made in consultation with DEQ. Final DSRs are subject to comment, review and approval by EPA in consultation with DEQ. Quarterly data reports, without full QA/QC information, shall also be provided by the SDs to EPA and DEQ. However, the SDs shall complete validation of laboratory data throughout the year in an effort to ensure that the laboratory data meet the QA/QC requirements.
4. *Surface Water Compliance Comparison and Interpretation Report* – The description and content of the report is included in Section 7.3 of this SWMP and shall be prepared annually by the SDs. Such a report shall be submitted in draft by June 30th of each year for EPA comment in consultation with DEQ, and is subject to EPA approval.
5. *Preliminary Diagnostic Evaluation Report* – Presents the results of the evaluation of the cause(s) of an exceedances.
6. *Diagnostic Response Investigation Plan and Report* – If the preliminary report indicates that an investigation is needed the Diagnostic Response Investigation Plan is developed and the investigation is conducted. A Diagnostic Response Investigation Report presenting the finding of the investigation shall be submitted in draft for EPA comment in consultation with DEQ.
7. *Optimization Report* – As required by EPA, in consultation with DEQ, and consistent with the requirements of the CD and Attachment A, a technical optimization and recommendations report shall be prepared by the SDs upon EPA request to implement the recommendations of the Diagnostic Response Investigation Report. The report shall describe proposed changes to surface water conveyances and other remedial elements, SDs' recommendations regarding surface water monitoring, and any modified surface water monitoring requirements. The report is subject to review and approval by EPA in consultation with DEQ.
8. *Design and Implementation of Recommendations* – Following approval of the recommendations in the optimization report and as required by EPA in consultation



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

with DEQ, SDs shall prepare draft RD plans for implementation of approved optimization or additional response. Upon EPA approval, in consultation with DEQ, of a final RD plan and accompanying RA plan, SDs shall implement the work required by these plans.

9. *Construction Completion Reports (CCR)* – Implementation of recommendations shall be documented through CCRs as required.
10. *Long-term Database* – Development of a long-term database for surface water will be described by the SDs in the sitewide data management plan, and implemented by the SDs upon approval.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

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Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **FIGURES**





UNAVOIDABLE OCCURRENCE

WET WEATHER COMPLIANCE MONITORING

## PERFORMANCE MONITORING

## NORMAL FLOW COMPLIANCE AND PERFORMANCE MONITORING

REV	DESCRIPTION	DATE
DESIGNED BY: ##	CHECKED BY: ##	
DRAWN BY: ##	CD-SAMPLING TOUR-REV.##	

**TYPICAL DISCHARGE  
STRUCTURE WITH  
PRIMARY OUTLET**

ATLANTIC RICHFIELD  
BUTTE, MT

BUTTE PRIORITY SOILS  
OPERABLE UNIT (BPSOU)

JOB NO.:0232350
DATE:10-15-2019
SCALE: NA
SHEET: 1 OF 1

FIG 5-1



Figure 8-1  
Summary of  
Sediment Criteria  
Comparison  
Process

BPSOU Surface Water  
Management Plan

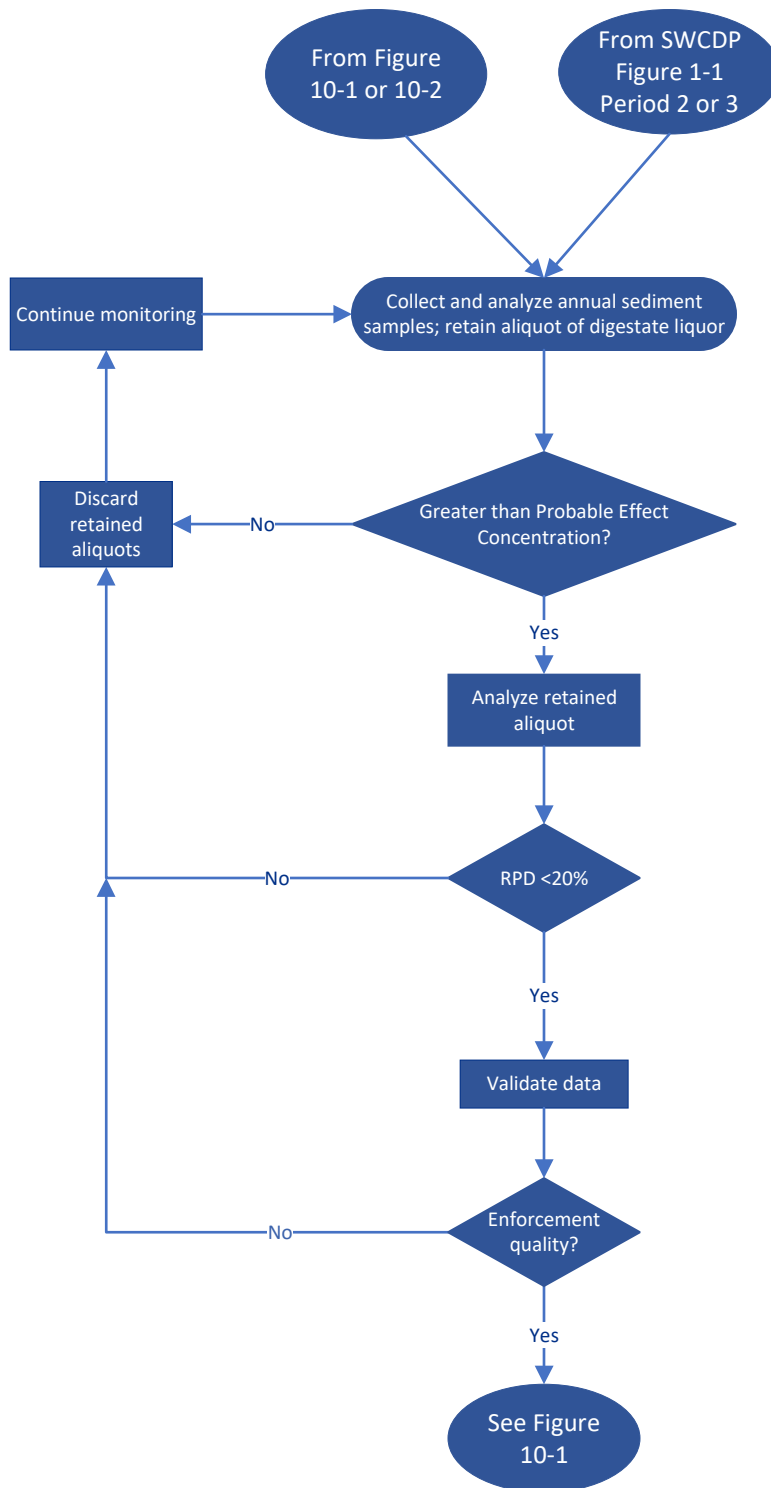
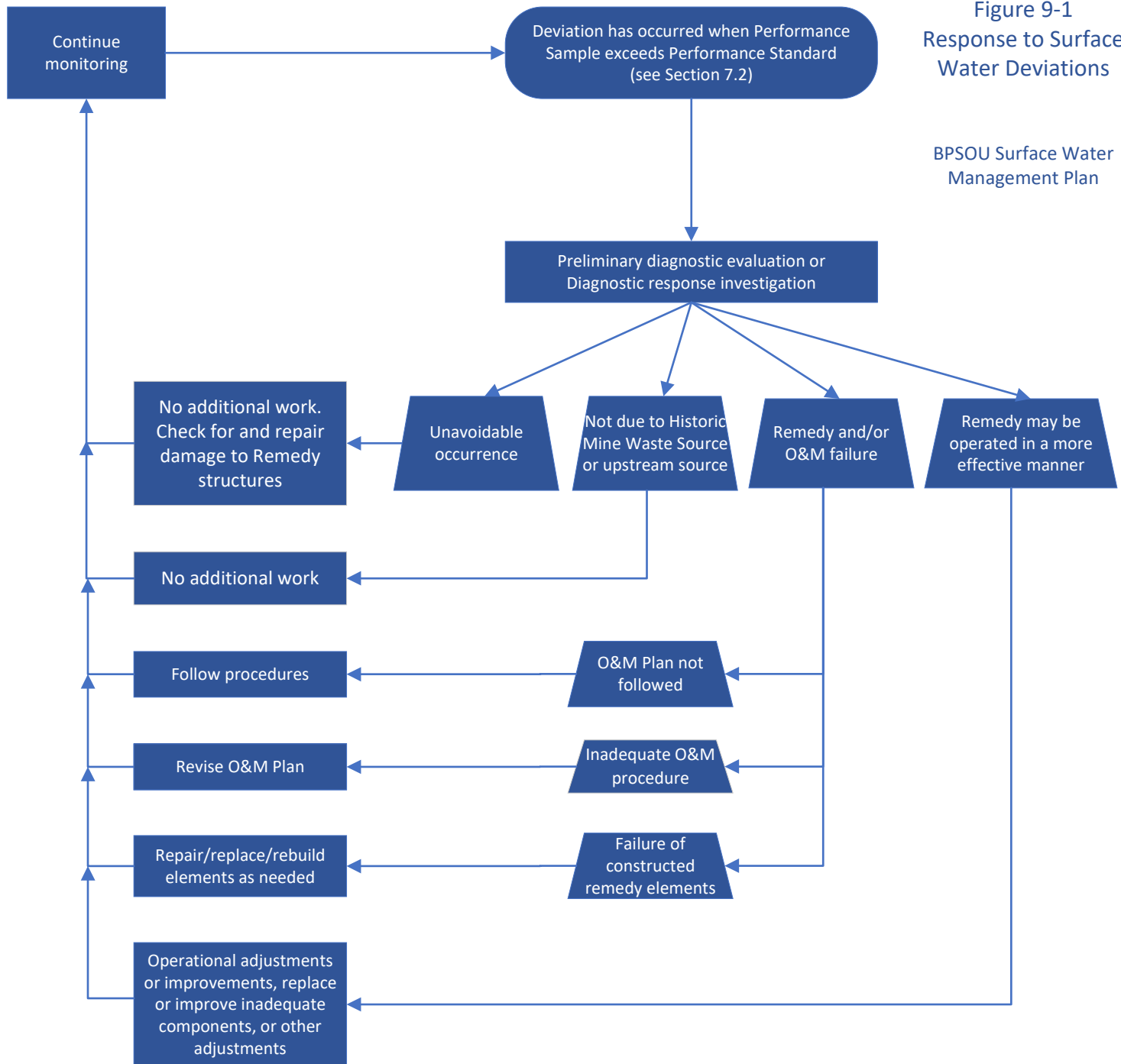




Figure 9-1  
Response to Surface  
Water Deviations

BPSOU Surface Water  
Management Plan



Note: An unavoidable occurrence is defined as a condition when a single storm event exceeds the design volume of a main stormwater retention/detention basin or a condition not controlled by the remedy.

**HMWS** = Historic Mine Waste Source shall mean a source, or a combination of sources, such as former mine yards; pre-1980 waste rock piles; pre-1980 mining, milling or smelting wastes (excluding historic smelter emissions); pre-1980 tailings impoundments; or open pit mines within the BPSOU.

Historic Mine Waste Source does not include:

- A. A source which is substantially from a primary source located outside of the BPSOU surface boundary;
- B. A source which is associated with such things as metal-bearing construction materials (such as copper piping or wire, lead solder or fittings, copper or galvanized roofing material) of homes or businesses or other commercial structures; or
- C. A source which is controlled by an existing, enforceable and separate regulatory program such as activities governed by the Butte Silver Bow County ordinance governing stormwater control at construction activities.

**O&M** = Operation and Maintenance

**This figure does not alter the actions that EPA or the State may take under the reservation of rights described in the consent decree, Section XVII**



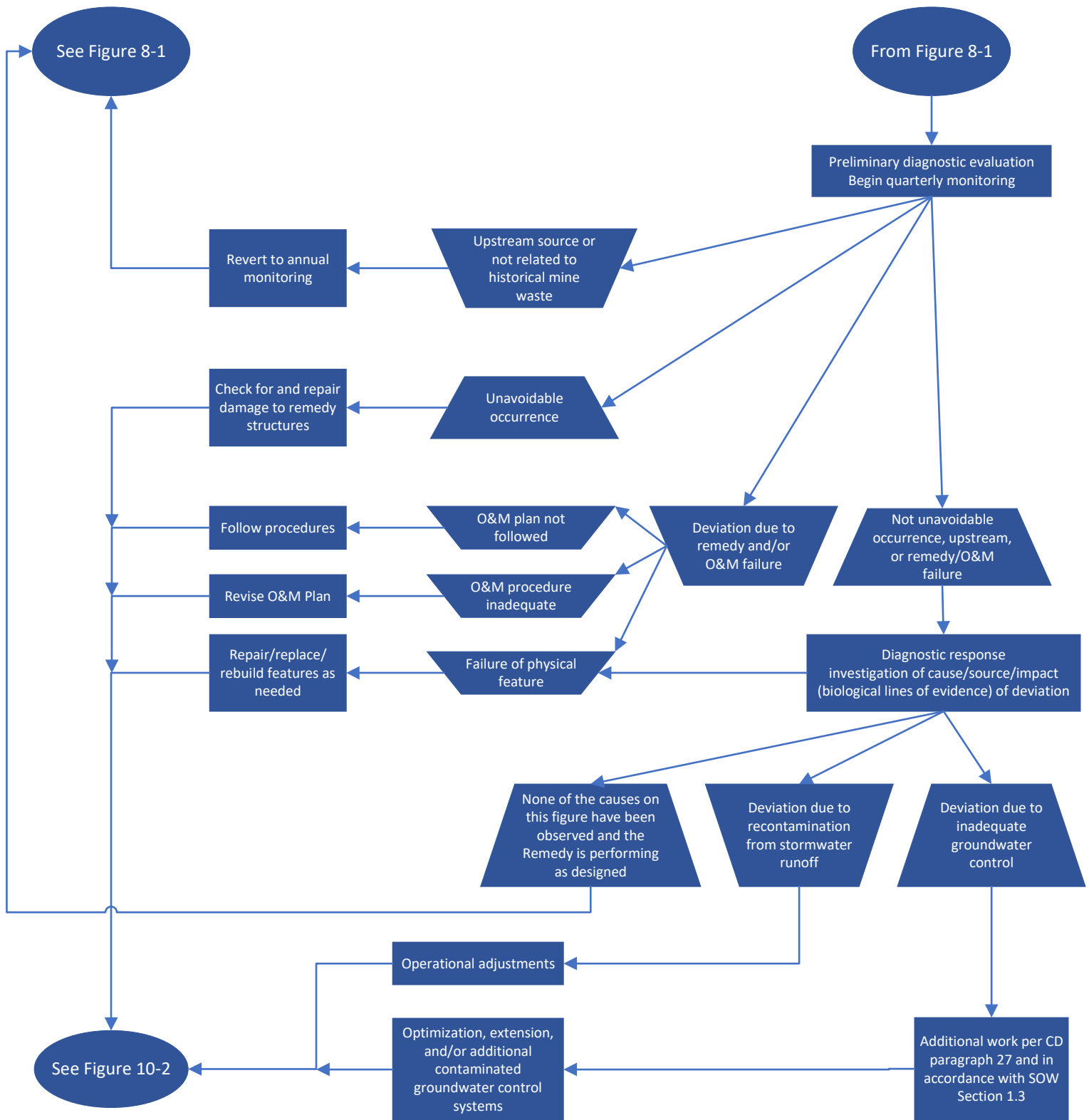
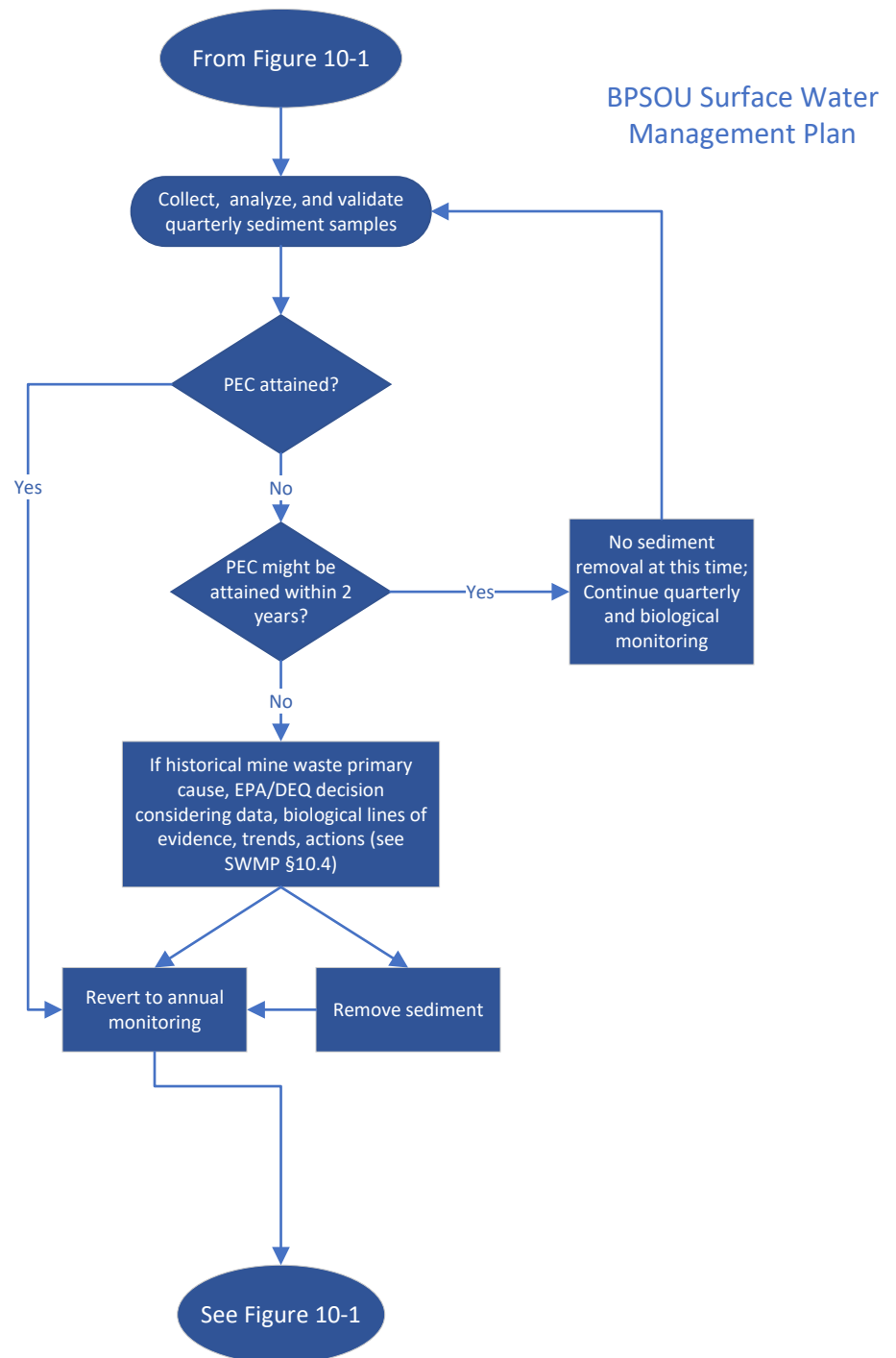


Figure 10-1  
Response to Annual  
Sediment  
Monitoring

NOTE: An unavoidable occurrence is defined as a condition when a single storm event exceeds the design volume of a main stormwater retention/detention basin or a condition not controlled by the remedy.



Figure 10-2  
Response to Quarterly  
Sediment Monitoring





Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **TABLES**



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**Table 8-1. Probable Effect Concentrations for Sediment (Ingersoll *et al.* 2000, MacDonald *et al.* 2000)**

Contaminant of Concern	Probable Effect Concentration (mg/kg, dry weight, bulk sample)
Arsenic	33
Cadmium	4.98
Copper	149
Lead	128
Mercury	1.06
Zinc	459

mg/kg – milligram per kilogram

**Table 9-1. SWMP Lines of Evidence for Additional Groundwater Hydraulic Control**

Medium	Metric	Criteria
<b>Monitoring</b>		
Sediment	Bulk sample (<2mm) contaminant concentrations	Probable Effects Concentrations (PECs, Table 8-1). Exceedance of PECs will be considered a “sediment deviation” and will trigger a preliminary diagnostic investigation and quarterly sediment monitoring unless the contaminated sediment is removed.
Surface Water (Normal Flow)	Contaminant concentrations	Surface water compliance exceedances during normal flow will trigger a diagnostic evaluation.
<b>Diagnostic Response Investigation</b>		
Sediment	Bulk sample (<2mm) contaminant concentrations	Statistically significant trends of quarterly COC concentrations per depth interval, that indicate sediments will continue to exceed PECs as a result of contaminated GW discharge.
Surface Water (Normal Flow)	Contaminant concentrations	Statistical trends or significant differences of contaminant concentrations between adjacent performance monitoring stations
Groundwater	Hydraulic gradient	Interpret groundwater gradient between surface water and adjacent groundwater to determine the potential for contaminated groundwater to impact surface water and sediment quality
Groundwater	Contaminant concentrations	Document groundwater COC concentrations adjacent to surface water areas of evaluation and the potential for contaminated groundwater to impact surface water and sediments quality.
Pore Water	Contaminant concentrations	Interpret contaminant concentrations from within the hyporheic zone to inform potential source of contamination.



**2019 STATUS FOR THE 2011 UNILATERAL  
ADMINISTRATIVE ORDER WORK PLAN FOR BPSOU  
PARTIAL REMEDIAL DESIGN/REMEDIAL ACTION  
IMPLEMENTATION**

**BUTTE PRIORITY SOILS OPERABLE UNIT  
of the  
SILVER BOW CREEK / BUTTE AREA SUPERFUND  
SITE**

**Butte-Silver Bow County, Montana**

**ATTACHMENT B TO APPENDIX D  
TO THE CONSENT DECREE**



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## TABLE OF CONTENTS

<b>1.0 INTRODUCTION.....</b>	<b>1</b>
<b>2.0 MAJOR BPSOU ROD COMPONENTS .....</b>	<b>1</b>
2.1 Residential Contamination .....	2
2.2 Non-Residential Solid Media and the Butte Reclamation Evaluation System.....	3
2.3 Groundwater .....	4
2.4 Surface Water .....	8
2.5 Groundwater Treatment Facility .....	10
2.6 Surface Water Monitoring and Compliance Requirements.....	11
2.7 Other Remedial Components – Syndicate Pit, Granite Mountain Memorial Interpretative Area, and Butte Mine Waste Repository .....	14
2.8 Institutional Controls .....	15
2.9 Operation and Maintenance.....	16
<b>3.0 SPECIFIC WORK REQUIREMENTS FOR 2011 AND 2012 FOR PARTIAL REMEDY IMPLEMENTATION.....</b>	<b>16</b>
3.1 Residential Contamination .....	17
3.2 Non-Residential Solid Media and the Butte Reclamation Evaluation System (BRES) .....	18
3.3 Ground Water .....	20
3.4 Surface Water .....	28
3.5 Groundwater Treatment Facility and Related Facilities.....	34
3.6 Surface Water Monitoring.....	37
3.7 Other Remedial Requirements.....	37
3.8 Institutional Controls .....	38
3.9 Operations and Maintenance (O and M) .....	39
3.10 2011 UAO PRI Work Plan Appendices .....	41



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## 1.0 INTRODUCTION

This document contains updated information regarding Remedy activities required under the 2011 Unilateral Administrative Order for BPSOU Partial Remedy Design/Remedial Action Implementation and Certain Operation and Maintenance at the Butte Priority Soils Operable Unit, EPA Docket No. CERCLA-08-2011-0011. It is based on the Partial Remedy Implementation Work Plan attached to that order, and, beginning in Section 2.0 below, repeats verbatim (with some modifications to match current consent decree definitions) the Partial Remedy Implementation Work Plan requirements, followed by a 2019 update which describes the current status of the Remedy Work required under that order. Finally, the document contains references to the BPSOU Statement of Work (SOW) and its attachments, where the ongoing work requirements based on the 2011 Partial Remedy Implementation Work Plan are described.

This Attachment B describes the status, as of June 2011 and as of July 2019, of certain remedial design and remedial implementation efforts for the 2006 Butte Priority Soils Operable Unit (BPSOU) Record of Decision (EPA 2006) as modified by the 2011 BPSOU Explanation of Significant Differences (ESD) (EPA 2011).

The 2011 Partial Remedy Implementation Work Plan (PRI Work Plan) was not a comprehensive or final work plan for implementation of the 2006 BPSOU Record of Decision.

## 2.0 MAJOR BPSOU ROD COMPONENTS

This section describes briefly the major components of the 2006 BPSOU Record of Decision as modified by the 2011 BPSOU ESD. A more complete description of the components is found in the 2006 Record of Decision and the 2011 BPSOU ESD themselves.

The 2006 BPSOU Record of Decision states that the cleanup will address potential and actual threats to human health or welfare or the environment from heavy metals and arsenic in mine waste and contaminated soils related to historic mine waste sources in the BPSOU.

Certain Performance Standards are set forth in the 2006 BPSOU Record of Decision<sup>1</sup>. Performance Standards are directly linked to the long-term protection of human health and the environment from contaminants of concern present at the BPSOU, and include the ARARs for the site (Appendix A to the 2006 BPSOU Record of Decision) and the soil, ground water, and surface water action levels described in Tables 1, 2, and 3 (Appendix A to the PRI Work Plan). Other key Performance Standards are the vegetation, weed and erosion standards described in the Butte Reclamation Evaluation System (BRES), which is an attachment to the 2006 BPSOU Record of Decision. Performance of the full Remedy must ultimately comply with performance standards, and Performance Standards will be monitored through comprehensive and interrelated monitoring programs for each media, respectively. These monitoring programs will be reviewed and approved by EPA in

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<sup>1</sup> The 2020 BPSOU Record of Decision Amendment modifies certain in-stream surface water Performance Standards, as described in the BPSOU SOW and its Attachment A.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

consultation with DEQ.

## **2.1 Residential Contamination**

### **General Remedy Description:**

EPA's action levels for residential, commercial/ industrial, and recreational soils and dust are described in Table 1, Appendix A to the PRI Work Plan.

The Remedy requires yards, recreational, and industrial/business areas be remediated if yard soils, interior dust in living spaces and/or attics, if an attic pathway exists, are above applicable action levels. The yard/recreational/business location and indoor dust cleanup apply throughout the BPSOU, and the attic dust portion applies throughout the BPSOU and to an area adjacent to the BPSOU. The Butte Site map, Appendix C to the UAO, describes the areas in which each of these elements will be applied.

*2011 Status: Remedial Design produced a remedial action plan for this component. The plan is known as the Residential Metals Abatement Program Plan (April 2010). This plan was approved by EPA and the State of Montana Department of Environmental Quality (DEQ) after informal public review and comment. The April 2010 Residential Metals Abatement Program plan, including all schedules, is incorporated by reference into this PRI Work Plan.*

**Current 2019 Status: The Residential Metal Abatement Program (RMAP) plan continues to be implemented by the Settling Defendants (SDs) and the RMAP plan is currently in the process of being revised. The revision will include the components of the program described in the ROD including the 2011 ESD and the expansion of the soils program to certain areas outside of the BPSOU addressed in the 2020 Record of Decision Amendment (2020 ROD Amendment).**

The Residential Contamination component of the ROD, otherwise known as the Residential Solid Media Remedial Action (implement through the Residential Metals Abatement Program plan (RMAP)), is not addressed in the BPSOU SOW or in the BPSOU Consent Decree. The EPA will use other enforcement mechanisms to implement this component of the ROD.

## **2.2 Non-Residential Solid Media and the Butte Reclamation Evaluation System**

### **General Remedy Description:**

As noted, action levels for contaminated solid media in residential and non-residential portions of the BPSOU are shown in Table 1, Appendix A to the PRI Work Plan. All contaminated solid media within the BPSOU containing concentrations of arsenic, lead, or mercury related to historic mine waste sources



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

above the respective action levels shall be addressed. Also, source areas that do not exceed action levels shall be addressed if diagnostic monitoring performed as part of the surface water management and BMP program indicates that the source area contributes contaminant loads to receiving surface waters during wet weather runoff.

The BRES (see 2006 BPSOU Record of Decision Appendix E) establishes the vegetation, weed, and erosion performance standard for all completed solid media response actions under the Remedy except residential yards and playgrounds. The system is specifically designed for use in the upland environment of Butte. To accommodate the diverse land types and end land uses within the BPSOU, the BRES is designed to address reclaimed uplands in residential, recreational, and commercial/industrial land settings, excluding residential yards and playgrounds. The system also has components that allow it to be applied to areas reclaimed as open space within this urban setting. Reclaimed areas, including cover soil caps, must achieve the performance standards described by EPA in the BRES document. This system is a tool created for the BPSOU to evaluate the site-specific stability, integrity, and degree of human and environmental protectiveness afforded by response actions initiated on lands impacted by mining within the Butte Site, as well as a tool to create and implement operation and maintenance plans and site-specific corrective action work plans for each area on a periodic basis.

The BRES is an evaluation tool for reclaimed and revegetated land, relying on routine inspections to assess the following:

- Condition and diversity of vegetative cover
- Presence of erosion
- Condition of site edges
- Presence of exposed waste material
- Presence of bulk soil failure or mass instability
- Presence of barren areas or gullies

The system also sets corrective action “triggers”, coordinated with the conditions listed above. Based on the periodic monitoring and evaluation of response action sites, the triggers noted in the BRES require corrective action in a timely and appropriate manner in accordance with the scheduling requirements of the BRES. Vegetated cover soil caps must support a diverse plant community including native species to the extent that the constituents of the vegetation cover are not incompatible with the Remedy.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

***2011 Status: The 2006 BRES, including all schedules and timetables described in BRES and including the need for written, approved work plans to address triggers and corrective actions, is incorporated into the PRI Work Plan by reference. Initial implementation efforts of BRES by the responsible parties have not produced timely or documented corrective actions (see the final Silver Bow Creek/Butte Area Five Year Review Report). Responsible parties shall implement BRES as written and provide any needed reports and work plans, including operation and maintenance plans and corrective actions plans documenting such compliance as directed by EPA in consultation with DEQ.***

**Current 2019 Status:** The BRES program, including the development of schedules and corrective action plans, continues to be implemented by the SDs. The 2006 BRES implementation plans will be revised in order to incorporate optimization techniques, new technologies and lessons learned from implementing the BRES procedures, and is pending Agency approval. The revised BRES implementation plans, as approved, will be an element of the Solid Media Management Program, and will be attached to the Solid Media Management Plan to be submitted by SDs for Agency review and approval.

**SDs ongoing remedial element requirements for the BRES Program, including a revised BRES plan, are described in Attachment B.1 Section 2.1.2.**

## 2.3 Groundwater

### **General Remedy Description:**

The ground water component of the Remedy requires the continued use of the Hydraulic Control Channel (HCC) and the BPSOU Subdrain capture and interception system to capture and pump contaminated ground water (and some surface water) into the Butte Treatment Lagoons facility for treatment prior to discharge. Both the HCC and the MSD<sup>2</sup> area capture and interception system are to be thoroughly evaluated and improved as needed. Under the 2011 Unilateral

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<sup>2</sup> The 2006 ROD and 2001 ESD identified this area as the Metro Storm Drain or MSD. Subsequently, a State of Montana court decision known as *Silver Bow Creek Headwaters Coalition v. State of Montana, DV-10-431* (August 17, 2015) declared that the surface area between Texas Avenue in Butte and the confluence of Blacktail and Silver Bow Creeks was named “Silver Bow Creek.” In prior Superfund removal and remedial documents and publications, including the 2006 Butte Priority Soils Operable Unit Record of Decision (2006 BPSOU ROD) and 2011 BPSOU Explanation of Significant Differences (ESD), EPA has called this surface area the “Metro Storm Drain.” Due to MDEQ’s involvement in this document’s issuance, and where reference to this specific section of Silver Bow Creek is necessary, further geographic descriptions, such as Silver Bow Creek “east” or “above” its confluence with Blacktail Creek” is used in order for DEQ to comply with the court’s order. Reference to the area as “Silver Bow Creek” or “Silver Bow Creek east of or above its confluence with Blacktail Creek” should not be construed as an admission or determination by any Consent Decree party on any procedural or substantive issue. The United States retains and reserves all its rights and authorities.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

Administrative Order, waste left in place in the Lower Area One (LAO) and Silver Bow Creek above the confluence with Blacktail Creek area will not be excavated<sup>3</sup>. Additional ground water control measures, such as infiltration barriers, ground water diversion, or other measures, may also be needed and are to be evaluated.<sup>4</sup> The ground water aquifer must be further evaluated and characterized to ensure the effectiveness of the interception and pumping systems. The area between the HCC and the MSD area capture and interception system must be further evaluated and controlled if necessary. Ground water monitoring and data reporting is required. As envisioned in the 2006 BPSOU Record of Decision. The wetlands demonstration area near Kaw Avenue and George Street will be used for the construction of an emergency over flow pond (a minor modification to the 2006 BPSOU Record of Decision (see page 12-34 of the ROD). A five year shakedown period for operation of the MSD interception and pumping facility is required. Institutional controls to prevent the domestic use of the alluvial aquifer are required.

The Remedy requires the capture and treatment of contaminated groundwater. The 2006 BPSOU ROD contained a waiver of ARAR standards for the alluvial ground water within the defined TI Waiver Area described in the 2006 BPSOU Record of Decision. The Remedy will not and is not intended to clean up groundwater to meet groundwater performance standards within the boundary of the waived standards. Therefore, there are no performance standards for groundwater in the area of the BPSOU alluvial aquifer that is covered by the TI waiver boundary. The TI boundary is shown in Figure 12-6 of the 2006 BPSOU Record of Decision. Based on the data collected since issuance of the 2006 BPSOU Record of Decision during the groundwater monitoring program, additional points of compliance may be determined necessary by EPA in consultation with DEQ in future remedial design (e.g., southern edge of the MSD).

Since the Remedy requires that contaminated plumes be prevented from migrating outside the established TI zone, the boundary for the TI zone represents the point of compliance boundary for groundwater, and groundwater performance standards must be met at these points of compliance and beyond. Groundwater quality standards (Table 3, Appendix A to the PRI Work Plan) will apply to groundwater at and beyond the edge of this boundary.

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<sup>3</sup> Additional removals within and along Silver Bow Creek above and below its confluence with Blacktail Creek, and Blacktail Creek itself are now required by the Consent Decree and are reflected in Attachment C to the BPSOU SOW. However, the Alluvial Ground Water TI Waiver remains part of the ROD and further excavation of waste to restore groundwater quality is not required beyond the removals described in Attachment C.

<sup>4</sup> As described in the 2020 ROD Amendment, further capping and hydraulic controls are now required, and are defined and explained in the BPSOU SOW, Attachments A, Exhibit 1 and Attachment C.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

Groundwater contamination outside of the boundary of the TI zone in excess of groundwater performance standards identified in Table 3, Appendix A to the PRI Work Plan shall constitute a violation.

Design of a groundwater treatment system at the Butte Treatment Lagoons facility and a sludge disposal plan must be approved by EPA, in consultation with DEQ, and the construction, operation, and maintenance of the facility will be monitored by EPA and DEQ in accordance with approved plans. The facility will be designed so that any discharge from the facility must meet water quality ARARs described previously and in Appendix A to the 2006 BPSOU ROD. Design, construction, maintenance, operation, and monitoring of the facility will be conducted according to the engineering standards established during remedial design and ARARs, and must be approved by EPA in consultation with DEQ. Treated water discharged to Silver Bow Creek shall meet all discharge requirements set forth in the ARARs. This discharge to surface water is discussed in greater detail in the following section.

***2011 Status: Remedial Design for this component is only partially completed with additional remedial design needed. A final remedial action plan for the ground water component of the Remedy has not been yet approved.***

***A well ban institutional control to prevent domestic ground water use was enacted and is in effect. A number of aquifer evaluations and related studies have been done under approved plans. Certain active measures for this component were done under the 2009 and 2010 Scopes of Work and order amendments (these two Scopes of Work are incorporated into this PRI Work Plan by reference). Additional remedial design actions and active measures that are ripe for implementation are described below in section 3.0. A Revised Interim Ground Water Monitoring Plan has been developed and shall be implemented as described below.***

***As noted, a final remedial action plan and a final Ground Water Monitoring Plan are not yet developed or approved and will be developed at a later date.***

**Current 2019 Status:**

**The BRW ponds have been expanded by the Respondents to the slag canyon to capture seepage entering Silver Bow Creek below its confluence with Blacktail Creek from the north side. Subsequently, an investigation by the Respondents for the area upgradient of the BRW and HCC capture systems was conducted. On-going monitoring of this area is being performed in accordance with the BRW Phase I investigation QAPP (AR, 2018).**



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**Preliminary conclusions indicate impacted groundwater enters Silver Bow Creek in and around the slag canyon; surface water monitoring, however, shows instream surface water ARARs are met most of the time.**

**The ongoing and further use of data and monitoring requirements for this area are being addressed as part of the Attachment B.1 Section 2.2.2.2 and Attachment C Section 6.**

**Additional investigation of groundwater conditions related to the BPSOU Subdrain (referred to in prior documents as the MSD subdrain) was conducted by the Respondents in 2011 to 2013. EPA prepared a groundwater data analysis report for monitoring data collected from 2011 through 2013. Further assessment of the effectiveness of the BPSOU Subdrain system, as modified by the work activities described in Attachment C, is a required element of the future work.**

**An O&M plan for the BPSOU Subdrain was prepared by the Respondents which includes semi-annual physical cleanout of the subdrain pipe along with quarterly sampling. Daily flow monitoring is used to evaluate the operating condition of the subdrain and if a minimum flow rate is reached, cleanout is conducted if outside the annual maintenance schedule.**

**BTL has undergone improvements by the Respondents to increase the reliability of the system including the addition of redundant pumps and pipes and an improved supervisory control and data acquisition (SCADA) electronic monitoring system to monitor and control operation of the treatment plant.**

**The interim groundwater monitoring plan has been updated annually and was converted to a QAPP format.**

**As part of the PRI Work Plan, Respondents completed analysis of contaminant levels in alluvial wells to evaluate the TI boundary described in the 2006 BPSOU ROD. The evaluation concluded that the then-identified Point of Compliance (POC) wells were located within the area of historical impact and that the POC wells were not appropriate for assessment of whether expansion of the area of impact within the alluvial aquifer has or is occurring. The process for establishment of POC wells, which may be either (or a combination of both) new or existing monitoring wells, will be described in the 2019 Groundwater QAPP to be submitted by SDs for approval. EPA and DEQ have approved SDs' revised POC well analysis in a letter dated October 22, 2019. Data collection to support EPA's review, in consultation with DEQ, of the TI boundary described in the 2006 BPSOU ROD and to establish new POC**



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**wells is on-going. SDs ongoing remedial element requirements for groundwater remedial and O&M activities are described in the BPSOU SOW Section 1.5 (b) and (e), Attachment B.1 Sections 2.2 and 2.4.4 and Attachment C, Sections 5 and 6.**

## **2.4 Surface Water**

### **General Remedy Description:**

In addition to the robust implementation of the ground water remedial component described above to prevent contamination from ground water and certain captured surface water from contributing to exceedances of surface water Performance Standards), the 2006 BPSOU Record of Decision requires the removal of in-stream sediments and near stream contamination in the reach of Silver Bow Creek below its confluence with Blacktail Creek and certain areas of Blacktail Creek which were not addressed in the prior Lower Area One non-time critical removal action<sup>5</sup>. It also requires that the discharge from the Butte Lagoon Treatment Lagoons facility meet Performance Standards for discharges (see Section 2.6 below) in a permanent manner.

For wet weather conditions, the 2006 Record of Decision requires the remediation of several specifically identified sites which are known to contribute to contaminated storm water runoff (this requirement is part of the solid media component of the remedy and also addresses surface water remediation). The evaluation and implementation of Best Management Practices (BMPs) on a yearly basis to control wet weather run-off under a variety of scenarios and flows such that surface water Performance Standards are met is also required. If BMPs do not meet surface water Performance Standards within a fifteen-year time period, the 2006 BPSOU Record of Decision provides for contingency measures such as the construction of a collection and treatment plant system for stormwater and/or flow augmentation in Silver Bow Creek.

The overall remedial goal for the 2006 Record of Decision is to achieve and maintain the in-stream concentrations of site-specific COCs (aluminum, arsenic, cadmium, copper, iron, lead, mercury, silver and zinc) below the numeric surface water quality standards identified in the ARARs (Appendix A to the 2006 BPSOU ROD), for all flow conditions throughout the length of Blacktail Creek, Grove

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<sup>5</sup> These requirements have been expanded by the 2020 Record of Decision Amendment, and the required work is now reflected in Attachment C to the BPSOU SOW.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

Gulch Creek, and Silver Bow Creek below its confluence with Blacktail Creek within and directly downstream of the BPSOU<sup>6</sup>.

The Remedy requires an EPA approved comprehensive, long-term surface water monitoring program that will include collection of compliance and diagnostic flow and chemistry data for normal flow and wet weather conditions in receiving surface waters and within intermittent storm water conveyances at the BPSOU.

***2011 Status: Remedial Design for this component is only partially completed with additional remedial design needed. A final remedial action plan for the surface water component of the Remedy has not been developed or approved, and is not contained in this PRI Work Plan.***

***The specific sites identified in the 2006 BPSOU Record of Decision for reclamation due to storm water contribution have been addressed. Certain sediments and near-stream contamination have been addressed but more remedial design and remedial action for this component of the Remedy are required. EPA's 2008 Surface Water Characterization Report (EPA October 2008) provided significant data and analysis regarding COCs and stormwater and other wet weather events. This provided a basis for identifying and requiring up-front BMPs of a significant nature. The first and second cycle of BMPS and other actions were implemented in 2009 and 2010, and included the beginning of additional storm water capture in existing catch basins, the beginning of a curb and gutter program in the BPSOU, and a program for routinely cleaning out contaminated sediments from the BSB storm water conveyance system. A Third Cycle of up-front storm water control BMPs is identified below.***

***The BMP identification and implementation process will continue beyond the Third Cycle actions described below, along with surface water monitoring. Additional remedial design and remedial action measures will be required for a final surface water remedial action plan to be completed.***

**Current 2019 Status:** The Third Cycle upfront storm water controls have been constructed by the Respondents (except for the Buffalo Gulch storm water basin) and are now being monitored and maintained under their respective O&M plans. Plans for implementing the surface water remedy have been ongoing since the 2011 UAO. In place of the iterative 15-year program described in the 2006 BPSOU ROD, EPA, DEQ and the SDs have developed

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<sup>6</sup> The wet weather remedy plan, including the contingency requirement and certain in-stream surface water Performance Standards are now modified in the 2020 Record of Decision Amendment. The revised requirements are reflected in the BPSOU SOW and its attachments.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**nine remedial elements that will address or control storm water, as well as beds, bank and adjacent floodplain contamination. The implementation of the nine remedial elements will be the Fourth and Final Cycle upfront actions, including potential Optimization actions, if appropriate, for improving water quality in Blacktail Creek and Silver Bow Creek below its confluence with Blacktail Creek.**

**For ongoing and further remedial elements requirements for surface water remedial and O&M activities, see the BPSOU SOW Section 1.5 (c) and (e), Attachment B.1 Sections 2.3 and 2.4.5, Attachment C and Attachment D.**

## **2.5 Groundwater Treatment Facility**

### **General Remedy Description:**

As previously described, the Butte Treatment Lagoons facility shall be evaluated and designed to ensure that contaminated groundwater captured from MSD and LAO (and certain captured surface water that is transported to the facility) is treated to ARAR standards, the plant can be operated efficiently and effectively in a variety of conditions, and sludge disposal can occur in accordance with the 2006 ROD and ARARs. The treatment plant will meet “end of pipe” discharge standards defined as the lesser of the chronic or human health surface water quality standards presented in Table 3, Appendix A to the PRI Work Plan.

Paired total recoverable and dissolved samples shall be collected and analyzed for COCs. Hardness-based standards will be calculated using the hardness of the sample collected from the treatment plant discharge, as directed by Circular DEQ-7. Two, 24-hour composite samples will be collected each week on random days to monitor compliance (for example, sampling will not be limited to Mondays and Thursdays).

Other analytes that shall be monitored include: dissolved calcium and magnesium (for hardness calculations), total alkalinity, total dissolved solids, total suspended solids, and sulfate. Temperature and pH will be monitored daily. Additional required field parameters will be determined based on the operational needs of the facility.

***2011 Status: Phase I of the comprehensive evaluation and re-design of the Butte Treatment Lagoons facility and system is complete and implementation of those actions is addressed below. Phase II of the evaluation and re-design of the lagoon treatment system is also described below in Section 3.5. Sludge disposal plans are not yet complete.***



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**Current 2019 Status:** The upgrades of the Butte Treatment Lagoon (BTL) facility were completed by the Respondents in 2014 and this facility continues to operate. The draft final operation & maintenance and monitoring (OMM) plan was submitted to the Agencies on August 30, 2018. It is anticipated that the BTL OMM plan will be completed in 2019.

**SDs ongoing remedial and O&M requirements regarding the BTL system and facility are described in Attachment B.1 Section 2.4.4.**

## **2.6 Surface Water Monitoring and Compliance Requirements**

### **General Remedy Description for In-Stream Monitoring and Compliance during Normal Flow Conditions:**

In-stream surface water quality, as affected by historic mine waste sources, must meet surface water ARARs during normal flow conditions. Surface water flow and chemistry will be collected at least monthly from compliance monitoring stations GG-01 (Grove Gulch), SS-04 (Blacktail Creek), and stations SS-05, SS-05A, SS-06A, SS-06G, and SS-07 in Silver Bow Creek (Figure 12-7)<sup>7</sup>. All in-stream water quality samples shall be collected using the channel width integrated composite technique specified in the Clark Fork River Superfund Site Investigations Standard Operating Procedure (CFRSSI SOP) SW-1 – Collection of Surface Water Samples. Because of poor mixing at station SS-07, and the critical nature of this station, samples at SS-07 shall be collected using the depth and width integrating technique (used by the USGS), breaking the stream into 20 to 25 sections from bank to bank, and a churn splitter. Annual data summary reports shall be submitted to EPA showing the location, frequency and duration, and magnitude of exceedances for all COCs and shall include the data in an easily accessible electronic format such as a spreadsheet or database. The annual report will also present an interpretation for the source and significance of exceedances that occurred during the monitoring year.

***Current 2011 Status: Because the ground water and surface water remedial components have not yet been fully developed or implemented, in-stream surface water quality has been improved significantly but ARARs has not yet been attained, especially for copper. A final surface water monitoring plan has not been developed. The interim surface water monitoring report - Interim Surface Water Monitoring Plan (EPA, April 2007) is in effect. Annual reports are required under this plan and will be used to develop final remedial work plans***

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<sup>7</sup> The surface water monitoring and compliance requirements of the 2006 BPSOU ROD have been modified by the 2020 ROD Amendment. Matters related to compliance monitoring and compliance points are described in the Surface Water Compliance Determination Plan, Attachment A to the BPSOU SOW.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

*and monitoring plans. In addition, additional monitoring requirements to be implemented at this time are described below.*

**Current 2019 Status:** The normal flow surface water monitoring program continues to be implemented by the SDs under an interim plan that is updated annually. On an annual basis, the SDs submit data summary reports to the EPA and DEQ for review and approval. Attachment A to the SOW, the Surface Water Compliance Determination Plan (SWCDP) and the BPSOU Surface Water Management Plan (SWMP), Exhibit 1 to Attachment A of the BPSOU SOW, describe the surface water monitoring requirements for the Work conducted under the Consent Decree.

EPA and DEQ prepared a Surface Water Characterization report covering data collected from 2008 to 2013.

EPA and DEQ prepared a Draft Technical Impracticability Evaluation in 2018 to evaluate the practicability of attaining the remedial goals for surface water that is discussed in the 2020 Record of Decision Amendment. Certain waivers of in-stream surface water performance standards and replacement standards are included in the 2020 Record of Decision Amendment, based on the 2019 Technical Impracticability Evaluation.

SDs ongoing remedial requirements regarding surface water are described in Attachment A including the SWMP, Section 2.3 of Attachment B.1, and Attachment C.

**General Remedy Description for Monitoring and Compliance during Wet Weather Flow Conditions**

Wet weather flow conditions are defined as flow greater than 50 cfs at monitoring station SS-07 in Silver Bow Creek below its confluence with Blacktail Creek or greater than 35 cfs at station SS-04 in Blacktail Creek<sup>8</sup>. These threshold flows are substantially above normal base flows at the respective monitoring stations and were chosen as general guidelines to help ensure that data are collected during true wet weather conditions.

As envisioned in the 2006 BPSOU ROD, compliance during wet weather conditions meant consistently measuring concentrations of COCs at in-stream compliance monitoring locations for comparison with the Montana DEQ-7 acute aquatic life standards (Table 3, Appendix A to the PRI Work Plan). Water quality

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<sup>8</sup> These definitions have been revised in the 2020 Record of Decision Amendment, and revised definitions are reflected in Attachment A to the BPSOU SOW.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

in Silver Bow Creek below its confluence with Blacktail Creek within the Butte Site is affected by water flowing into the Butte Site (i.e., upstream in Blacktail Creek).

As envisioned in the 2006 BPSOU ROD, compliance with standards was expected to be achieved over the 15-year period described below. Once compliance is achieved over a period of time, then compliance with acute standards during wet weather conditions continued to be required consistently going forward. A final surface water monitoring plan was required.

A minimum of one automated sampler will be installed at each compliance monitoring station and at the upstream monitoring station to obtain data during wet weather conditions. Additional samplers may be required as deemed necessary during design, at some or all locations to obtain data for different portions of the storm hydrograph.

***2011 Status: Because the ground water and surface water remedial components have not yet been fully developed or implemented, in-stream surface water quality in wet weather conditions has been improved significantly but standards have not yet been attained. A final surface water monitoring plan, has not yet been developed. The interim surface water monitoring report - Interim Surface Water Monitoring Plan (EPA, April 2007) – is in effect. Annual reports are required under this plan and will be used to develop final remedial work plans and monitoring plans. In addition, additional monitoring requirements to be implemented at this time are described below.***

**Current 2019 Status:** The wet weather surface water monitoring program continues to be implemented by the SDs under an interim plan that is updated annually. On an annual basis, the SDs submit data summary reports to the EPA and DEQ for review and approval. The SWCDP, Attachment A to the SOW, and the SWMP, Exhibit 1 to Attachment A, will also describe the monitoring requirements for RD/RA.

EPA and DEQ prepared a Surface Water Characterization report covering data collected from 2008 to 2013, along with a Technical Impracticability Evaluation in 2018 to evaluate the practicability of attaining the remedial goals for surface water. Certain waivers of in-stream surface water performance standards and replacement standards, based on these documents and the administrative record, are incorporated into the 2020 Record of Decision Amendment. Furthermore, the EPA, DEQ and the Settling Defendants have prepared the SWCDP for determining compliance at surface water stations located within the site (Attachment A to the BPSOU SOW). Compliance will



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**be assessed utilizing measurements at in-stream locations after the nine remedial elements have been constructed in accordance with the SWCDP.**

**SDs ongoing remedial requirements for wet weather surface water remediation are described in Attachment A including its attached SWMP, Attachment C, and Attachment D.**

**2.7 Other Remedial Components – Syndicate Pit, Granite Mountain Memorial Interpretative Area, and Butte Mine Waste Repository**

**General Remedy Description:**

The Syndicate Pit within the BPSOU shall be reclaimed, to the extent practicable, for use as a mine training center if feasible. Shallow to moderate slopes will be reclaimed using soils caps, rock caps, and gravel parking areas. Steep slopes will not be reclaimed. The pit base will continue to be used as a sediment basin. The Granite Mountain Memorial Area shall be subject to various reclamation, use restrictions, and enhancements in keeping with its historical character. These include reclaiming source areas in publicly used areas, restricting access to certain areas of historic mining landscape, installing picnic areas and walking trails, enhancing existing vegetation, and diverting storm water runoff to the Berkeley Pit. These actions shall be consistent with the preservation requirements and other standards and the county's historical park plan. A Butte Mine Waste Repository was previously established and shall be used for the disposal of removed waste and contamination associated with BPSOU response actions. When the existing structure is full, it shall be closed in compliance with ARARs. A new repository will be sited next to the existing repository if that capacity is needed. It, too, would be closed using the same methods.

***2011 Status: The Syndicate Pit was reclaimed pursuant to an approved remedial action work plan. A construction completion report for the Syndicate Pit remediation component was prepared by the responsible parties (December 10, 2010) and approved by EPA and DEQ on May 10, 2011. Operation and maintenance actions are required at the Syndicate Pit. The Granite Mountain Memorial Interpretative Area (GMMIA) was remediated pursuant to two approved remedial action work plans (Phase I and Phase II). A construction completion report for the GMMIA remedy component has not yet been prepared by the responsible parties because the work is not complete for the GMMIA. 90 days after construction completion of the GMMIA, the PRPs will submit a draft CCR for review by EPA and DEQ and approval by EPA. Operation and Maintenance activities are required at the GMMIA. The initial Butte Waste Repository is in use and is nearly full. Requirements for development of a second repository***



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

*adjacent to the first repository are described below. Closure and monitoring activities are required for all waste repositories.*

**Current 2019 Status:** The GMIAA remedial work was completed and approved by EPA in consultation with DEQ. The Butte Waste Repository was expanded by the Respondents in 2013-14 and a construction completion report on the expansion was submitted by the Respondents and approved by EPA in consultation with DEQ on November 23, 2015. The Syndicate Pit, GMMIA and the Mine Waste Repository are being operated and maintained by the SDs under their respective O&M plans.

**SDs ongoing remedial and O&M requirements regarding the Syndicate Pit, the GMMIA and the Mine Waste Repository are described in the BPSOU SOW and Attachment B.1, Sections 2.4.1 through 2.4.3.**

## **2.8 Institutional Controls**

### **General Remedy Description:**

The 2006 BPSOU ROD requires the development, implementation, funding and enforcement and implementation of the following institutional controls (ICs) at a minimum: A. a controlled ground water area for the alluvial aquifer Technicality Impracticability zone to prevent domestic use of the contaminated ground water there as well as other controls for ground water use; B. Butte Silver Bow enacted zoning and ordinance/permit requirements for storm water controls, protection of capped and waste in place areas, removal and disposal of contaminated dirt, as well as other possible requirements; C. Deed notices under Montana state law for capped and waste in place areas; and D. fencing and signs where appropriate.

*2011 Status: ICs have not been fully implemented. The ground water control area IC was enacted by the State of Montana Department of Natural Resources on October 13, 2009. Butte-Silver Bow County enacted a storm water control ordinance in early 2011. The Group 1 responsible parties prepared a draft IC plan to address certain other IC requirements, which was submitted for informal public review on April 23, 2010. Approval of this plan by EPA is discussed below. The Group 2 responsible parties prepared a draft IC plan which is undergoing agency review and is subject to EPA approval at a later date. Fencing and signing are implemented upon request by EPA.*

**Current 2019 Status:** The controlled groundwater area (CGWA) for the groundwater TI zone was established in 2009 to prevent domestic and irrigation use of contaminated groundwater and for controlling use, subject to an exception for irrigation wells that were constructed prior to establishment of the CGWA. Butte Silver Bow County enacted an ordinance to regulate the



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**management and disposal of contaminated soils that are excavated by residents, and another ordinance to manage, track and enforce activities that prevent the spread of sediments into the Butte stormwater system. BSBC also implemented a program to protect reclaimed areas by installing engineered controls (i.e., fences) in areas to prevent unauthorized access.**

**A revised Institutional Control Implementation and Assurance Plan is attached to the Consent Decree as Appendix E.**

## **2.9 Operation and Maintenance**

### **General Remedy Description:**

Many aspects of the Remedy require long term operation and maintenance. This work must be done under approved and detailed operation and maintenance plans.

*2011 Status: There are several short-term operation and maintenance plans in existence. Long term plans for the various aspects are not yet complete.*

**Current 2019 Status: There are several Operations and Maintenance plans that are currently being implemented for protecting and maintaining the remedy components. Other O&M Plans are in the process of being developed. The more specific description of the status of all O&M plans is found in the Scope of Work, Appendix D to the Consent Decree. SDs ongoing O&M requirements are described in the BPSOU SOW Section 1.5 (e) and Attachment B.1 Section 2.4.**

## **3.0 SPECIFIC WORK REQUIREMENTS FOR 2011 AND 2012 FOR PARTIAL REMEDY IMPLEMENTATION**

This section describes briefly the major components of the remedial design, remedial action, and operation and maintenance work required for 2011 and 2012. As noted, the 2009 and 2010 Scopes of Work issued by EPA under other orders remain in effect and actions under those documents is required, in addition to the actions described below.

### **3.1 Residential Contamination**

As noted above, the final Multi-Pathway Residential Metals Abatement Program Plan (RMAP) (Responsible Parties April 2010), which is the remedial action work plan for this component of the Remedy, was approved by EPA and DEQ. This work plan is incorporated by reference into the PRIWP and shall be implemented by the Group 1 Responsible Parties. Soils action levels are described in Table 1, Appendix A to the PRI Work Plan.

For years 2011 and 2012, the Group 1 responsible parties shall sample and remediate the number of residential areas described for such years in the RMAP. Other required actions under the RMAP, such as medical monitoring, community



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

outreach and education efforts, and long term database upkeep and tracking, shall also be implemented as described in the RMAP. The Butte Site map, Attachment C to the UAO, describes the areas in which each of these elements will be applied.

In summary, as envisioned by the 2006 BPSOU ROD, the RMAP required that all residential properties within the BPSOU and the attics in the adjacent area noted on the map, Attachment B, be sampled, assessed, and abated within 20 years. A complete indoor and outdoor assessment (i.e., residential yard soil, indoor and outdoor dust, attic dust, lead-based paint, drinking water, and mercury vapor) of all residential properties that are known to be occupied or expected to be occupied was to be completed within the first 10 years of the initiation of the expanded program (initiation occurred in 2009). During this 10-year period, the clean-up of residential properties that exceed the action levels will occur in concert with the assessment program. In addition, the program uses community awareness and education, long term database upkeep and tracking, and medical monitoring to ensure its effectiveness.

The Group 1 responsible parties developed and submitted as part of the RMAP to EPA and DEQ for review and approval by EPA, in consultation with DEQ, a long-term tracking method and database to ensure that all data and residential activities are tracked. Properties that were not or are not occupied or the owner refused access during the assessment period will be tracked and abated in the future if necessary. In addition, the tracking program will follow changes in ownership and remodeling of homes that were found to have contaminated attic dust but no current pathway. The long-term BSB RMAP Data Base tracking program will be continued for at least 99 years.

The RMAP implementation shall include community awareness and education and medical monitoring conducted by the Group 1 Responsible Parties. Participation in the medical monitoring will be encouraged through community awareness and education. Medical monitoring shall use blood lead, blood mercury, and urinary arsenic data to identify individuals who have concentrations of those elements above risk-based thresholds. When individuals are found to have elevated blood lead, blood mercury, or urinary arsenic, the home where the affected person or persons live shall be scheduled for immediate sampling and evaluation. Residential remediation shall be performed if sampling determines that yard soil, interior living-space dust, or mercury vapor action levels are exceeded. The Group 1 Responsible Parties shall submit a draft Medical Monitoring Program Remedial Design Workplan deliverable as part of the RMAP. EPA and ATSDR, in consultation with DEQ will review and comment on the workplan deliverable. The final Medical Monitoring Program Remedial Design work plan deliverable shall be



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

submitted for EPA review and approval, in consultation with DEQ, and completed by November 30, 2012 and, until then, medical monitoring shall continue under existing protocols and plans.

Annual reports describing all activities under the RMAP shall be prepared by the Group 1 Responsible Parties by December 31, 2011 and December 31, 2012, in conjunction with the reports required in Section 15 of the RMAP.

**Current 2019 Status: As noted above, the RMAP plan continued to be implemented by the Respondents, but the deadlines required by the PRI Work Plan were unrealistic. SDs will continue to implement the updated RMAP under the revised RMAP plan approved by the Agencies. Key revisions include geographic expansion of the residential soils program, renewed logic for plan implementation, and a revised schedule that reflects the expanded scope for residential assessment, abatement and attic assessment / abatement. Furthermore, the SDs will continue to implement the medical monitoring program, as further defined and described in the revised RMAP plan, and distribute education materials to the public.**

**The Residential Contamination component of the ROD, otherwise known as the Residential Solid Media Remedial Action (implemented through the Residential Metals Abatement Program plan (RMAP)), is not addressed in the BPSOU SOW or in the BPSOU Consent Decree. The EPA will use other enforcement mechanisms to implement this component of the ROD.**

**3.2 Non-Residential Solid Media and the Butte Reclamation Evaluation System (BRES)**

Contaminated solid media located in non-residential areas within the BPSOU site include waste rock piles, smelter wastes, milling wastes, and contaminated soils. Solid media in non-residential areas including but not limited to commercial areas, open areas, and non-active mining areas may exceed action levels (see Attachment B). These areas may also pose a threat to the environment as a result of storm water runoff. For example, runoff from these areas is a source of copper and zinc loading to receiving waters.

Contaminated solid media shall be addressed through a combination of source removal, capping, and land reclamation. If a contaminated non-residential area is discovered, the PRPs will develop a draft site- specific work plan for the area within 45 days of discovery of the site and submit it to EPA for review and approval in consultation with DEQ.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

### **Butte Reclamation Evaluation System**

As noted above, The Butte Reclamation Evaluation System (BRES) (see 2006 ROD Appendix E) establishes the vegetation, weed, and erosion performance standard for all completed solid media response actions under the Remedy except for residential areas and playgrounds. The BRES is incorporated by reference into this PRIWP and shall be implemented by the Group 1 and Group 2 responsible parties in the manner described in the Unilateral Administrative Order. This includes the schedules and timetables for inspection, evaluation, and corrective action contained therein, as well as the requirement for specific work plans to address deficiencies found during the inspections and evaluations. This system is a site-specific tool to evaluate the stability, integrity, and degree of human and environmental protectiveness afforded by response actions initiated on lands impacted by mining within the Butte Site. Reclaimed areas, including cover soil caps, must achieve the performance standards described by EPA in the BRES document.

By July 14, 2011, work plans shall be developed for the sites that were evaluated during the 2007 and 2008 inspections and evaluations conducted by the responsible parties under BRES. The work plans will be submitted to EPA and DEQ for review and comment and approval by EPA. O&M and corrective action construction activities for these sites will be conducted during the 2011 field season; however, some projects may be completed in 2012 if necessary. By April 30, 2012, the remaining BRES work plans (for inspections and evaluations conducted in 2009 and 2010) shall be submitted to EPA and DEQ for review and comment and approval by EPA. These sites will be approved by EPA in 2012 and construction activities will be completed by the end of field season 2012, however some projects may be completed in 2013 if necessary (see Appendix C to the PRI Work Plan, Schedule).

**Current 2019 Status: The BRES program continues to be implemented by the SDs to address the presence of remnant wastes from historic mining activities (waste rock piles, smelter wastes, milling wastes, and contaminated soils) within the BPSOU. The activities in the existing program include; training of the field team on the BRES procedures, evaluation of reclaimed sites, reporting of field data, development of corrective action plans, implementation of corrective action plans, and an annual summary report. The various related BRES plans will be submitted by the SDs for agency review and approval.**



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**SDs ongoing BRES and other non-residential media requirements are described in Attachment B.1 Section 2.1.2.**

**Long Term Tracking and Database**

The Group 1 and Group 2 responsible parties shall develop daily Construction Activity Reports and submit them to the EPA and DEQ by close of business each Friday for the past week's BRES activities. All data concerning the BRES inspections, evaluations, and corrective actions shall be added to the BRES O&M Data Base. In addition, the BRES O&M data base will be updated weekly and submitted to EPA and DEQ for review. The data base shall be updated with all of the approved reports and other information created to date by December 31, 2011 and shall be maintained as described above thereafter.

**Current 2019 Status: The BRES data is being managed in a web-based database.**

**SDs ongoing remedial requirements regarding BRES and long-term data tracking are described in the BPSOU SOW Section 6.7(f) and Attachment B.1 Section 2.1.**

**3.3 Ground Water**

**MSD Subdrain (as named by EPA prior to a 2015 State district court ruling – the subdrain is now referred to as the BPSOU Subdrain)**

The former Metro Storm Drain (MSD), now the BPSOU Subdrain, extends from the BSB City/County Shops approximately 4,000 feet through the corridor extending to the confluence with Blacktail Creek. It has been improved and upgraded over the last several years under initial remedial design and remedial action efforts. Contaminated alluvial groundwater shall continue to be captured by the subdrain ground water interception and pumping system under the channel and/or another appropriate groundwater collection system by the Group 1 and Group 2 Responsible Parties. The captured groundwater shall continue to be pumped from the terminal vault in the subdrain to the Butte Treatment Lagoons facility at LAO by the Group 1 and Group 2 Responsible Parties. The captured and pumped water will be treated by lime precipitation technology as described below by the Group 1 and Group 2 Responsible Parties before being discharged to Silver Bow Creek. All necessary operation and maintenance activities for the BPSOU Subdrain groundwater interception and pumping system shall be implemented by the Group 1 and Group 2 Responsible Parties.

**Current 2019 status: This remedy element is now known as the BPSOU Subdrain. The Respondents have provided and SDs will continue to provide**



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**ongoing treatment of water collected from the BPSOU Subdrain. The BPSOU Subdrain is being monitored, operated, and maintained following the procedure in the Draft Final Butte Treatment Lagoon Groundwater Treatment System Routine Operations, Maintenance, and Monitoring Plan. The Draft Final Butte Treatment Lagoon Groundwater Treatment System Routine Operations, Maintenance, and Monitoring Plan was submitted in 2018 for agency review and approval, and EPA and DEQ submitted review comments on the document in December 2018.**

**SDs ongoing remedial and O&M requirements regarding the BPSOU Subdrain are described in Attachment B.1 Section 2.4.4.**

**Wetland Demonstration Area/Contingency Overflow Pond**

The sedimentation basin/former wetland demonstration project area near the intersection of Kaw Avenue and George Street shall be used as a contingency overflow pond for the operation and maintenance of the subdrain groundwater interception and pumping system. The Group 1 and Group 2 Responsible Parties shall submit a draft contingency overflow pond remedial action workplan to EPA and DEQ for review in consultation with DEQ by July 31, 2011. A final deliverable shall be submitted within thirty days of receipt of comment for approval by EPA in consultation with DEQ. Remedial Action activities shall begin under this plan shall begin in 2011 and be completed in 2012.

**Current 2019 Status: In 2015 a redundant pipeline was installed from the BPSOU Subdrain vault to the Hydraulic Control Channel (HCC). This redundant pipe was installed as a backup to the primary pipeline that carries contaminated groundwater from the BPSOU Subdrain vault to the HCC. The redundant pipeline replaced the need for an overflow pond. The former wetland demonstration area will now become part of the stormwater control structure for the Buffalo Gulch area.**

**The SDs will continue to operate the HCC including the redundant pipe as part of the BPSOU Subdrain system. SDs further remedial requirements regarding this area are described in the BPSOU SOW and Attachment C, Section 2.**

**Irrigation Control**

Current land use practices in the MSD area, particularly in some areas overlying portions of the Parrott Tailings, do not minimize recharge of groundwater through areas containing waste. Irrigated ball fields and unpaved portions of the City County Shops overlie a portion of the Parrott Tailings. Recharge of the groundwater



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

is significantly increased by irrigation of the ball fields and melting of plowed snow that is frequently piled on the County Shop property. The Group 1 and Group 2 Responsible Parties shall immediately cease irrigation of the ball fields overlying the Parrot Tailings and discontinue the use of the unpaved County Shop area to pile snow removed from city streets and pavements. See Appendix D to the PRI Work Plan, the EPA direction letter of November 18, 2008 on this matter. The Group 1 and Group 2 Responsible Parties may complete a study to determine if there is a method to water the turf on the ball fields which would prevent the irrigation water from migrating into the tailings. If such a study is completed, that deliverable will be submitted to EPA for review and approval by EPA in consultation with DEQ.

**Current 2019 Status: As required by the UAO WP, the Respondents stopped irrigating and storing snow in the vicinity of the ball fields. In June 2018, the Respondents submitted the Draft Street and Snow Management Plan to outline procedures and management responsibilities for managing street and snow management practices. Agency review and approval of the Street and Snow Management Plan is on-going (agency comments were submitted in August 2018). SDs will submit the updated document for Agency review and approval.**

**SDs ongoing remedial requirements regarding the Street and Snow Management O&M Plan are described in the BPSOU SOW Section 1.5 (e) and Attachment B.1 Section 2.4.6.**

#### **Localized Groundwater Study**

The Group 1 and Group 2 Responsible Parties shall develop a groundwater study work plan to characterize groundwater flow properties and quality in the area between the subdrain vault and the groundwater collection features at the Butte Reduction Works. The draft groundwater study work plan shall be submitted to EPA and DEQ by the Group 1 and Group 2 Responsible Parties for review and comment. The final deliverable shall be submitted within thirty days of receipt of EPA comments for approval by EPA in consultation with DEQ by October 20, 2011. Additional groundwater monitoring wells may be necessary to conduct the study and, if so, shall be described in the work plan or ordered by letter from EPA. The assessment of the groundwater for this area shall be completed by December of 2012.

**Current 2019 Status: An investigation for the area upgradient of the BRW and HCC capture systems was conducted by the Respondents. Monitoring for this investigation continues under the BRW Phase I Investigation QAPP. The**



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**preliminary conclusion is that impacted groundwater enters Silver Bow Creek in and around the slag canyon.**

**SDs further remedial elements requirements regarding the localized groundwater study are described in Attachment B.1 Section 2.2.2.2 and Attachment C, Section 6.**

**Groundwater Flow Monitoring for the Subdrain**

Load monitoring in the Subdrain was completed once in 2009 and was presented by the Group 1 and Group 2 Responsible Parties in the Draft Final Metro Storm Drain (MSD) 2009 Tracer-Dilution Study Technical (Atlantic Richfield 2010). This investigation concluded that alternative methods of measuring flows and loading would be equally effective and easier to implement than dye tracer methodology. As a result, the requirement for load monitoring using a dye tracer will be replaced by an alternate monitoring method as described in the 2011 ESD. Flumes shall be installed by the Group 1 and Group 2 Responsible Parties within manholes in the subdrain immediately and a load monitoring plan will be developed as a part of O&M of the Subdrain groundwater interception and pumping system to determine whether the subdrain continues to operate as expected and is not fouling or clogging. At a minimum, the load monitoring plan shall address the following elements:

- Determine a pumping level in the vault that ensures that the subdrain is not adding contaminated water back into the aquifer in the vicinity of the pump vault
- Establish flumes or weirs and totalizers within the subdrain to continuously monitor flow
- Identify monitoring wells adjacent to the subdrain to be monitored that will signify when subdrain cleanouts are needed
- Overall description of flow measurement and monitoring procedures
- Location and description of monitoring points
- Description of flow measurement techniques
- Developing an SOP for the flow measurement and water sampling within the subdrain
- Monitoring schedule based on two monitoring events per year to be conducted at high water table conditions (approximately June or July) and



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

low water table conditions (approximately October or November) of each year.

An annual data summary report shall be prepared no later than June 30 of the year following data collection that includes: all measurements, analytical results and field notes for monitoring events; all flow rate and pumping rate data for the year; water level data from pertinent monitoring wells for the year; all analytical data pertinent to the subdrain collected between monitoring events; calculation of loads and mass balance to determine if the pumping rate is matching the subdrain collection rates and to assure that the subdrain is not adding contaminated water back into the aquifer near the pump vault; recommendations for operations changes, if needed; and other elements typical of a data summary report.

**Current 2019 Status: This remedy element is now known as the BPSOU Subdrain. Sampling for the loading study was conducted by the Respondents from 2011 through 2014. Annual data summary reports were submitted by the Respondents for 2012 through 2015 and an interpretive report was submitted by the Respondents in 2016. A number of flow monitoring methods were tried in the subdrain which has a low pH and issues with scaling. All of the cleanouts originally installed in 2004 were removed and replaced by the Respondents with manholes fitted with blinding wings to direct all water through the manholes. Each manhole now contains either a flume or open pipe with flow instrumentation. The most reliable flow measurement device for this system is a magnehelic totalizing meter mounted on the outside of the pipe at the pump vault.**

**The SDs shall assess, construct appropriate improvements and continue to operate the BPSOU Subdrain as a key remedial element. For ongoing remedial and O&M requirements for the BPSOU Subdrain, see the BPSOU SOW Section 1.5 (b) and Attachment B.1 Sections 2.2 and 2.4.4.**

**BRW East End Grading and BRW Upgrades Work Plans**

The Responsible Parties previously submitted, and EPA approved, a Butte Reduction Works Remedial Action Work Plan (2010). The tasks outlined in the BRW Upgrades work plan are primarily completed. A punchlist has been developed for the remaining work and includes various small maintenance tasks along the channel. The tasks remaining to be completed under this punch list include replacing the cleanout caps along the channel, performing minor slope repair along the channel, and some miscellaneous fencing to be done along the channel and in the BRW area. This work shall be implemented by the Group 1 and



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

Group 2 Responsible Parties and be conducted throughout the summer and completed in the fall of 2011.

The Responsible Parties previously submitted, and EPA approved, a BRW East End Grading Plan. Per the BRW East End Grading Work Plan, Responsible Parties have completed all grading of the BRW-01 East, BRW-01 West, and BRW-00 ponds. This grading was completed to change the groundwater gradient to allow contaminated water to be collected in these ponds and reduce metals loading to Silver Bow Creek below its confluence with Blacktail Creek. The remaining task to be completed under this work plan includes completion of the access road through the site and re-seeding of disturbed areas within BRW. This work shall be completed by the Group 1 and Group 2 Responsible Parties in early summer of 2011.

**Current 2019 Status: A noted above, portions Silver Bow Creek above its confluence with Blacktail Creek have been referred to as “MSD” in prior site documents. The area is now known as the Silver Bow Creek, and the subdrain is known as the BPSOU Subdrain. The Respondents completed the BRW East End Grading and Upgrades project in 2012. A construction completion report for this project was prepared by the responsible parties and approved by EPA and DEQ on August 7, 2012.**

#### **Culvert Removal**

In addition to this grading work, the Group 1 and Group 2 Responsible Parties shall remove both sets of culverts located in the LAO section. The upstream culverts and local sediments upstream of the culverts are anticipated to be permanently removed in the fall 2011. The Group 1 and Group 2 Responsible Parties shall develop a work plan to replace the downstream culverts with a more permanent vehicle crossing structure and submit this deliverable to EPA for review and approval by EPA in consultation with DEQ by January 31, 2012. This work will be completed in 2012.

**Current 2019 Status: The Responsible Parties completed the two Culvert Removal projects in 2012. A construction completion report for this project was prepared by the responsible parties and approved by EPA and DEQ on August 7, 2012.**

#### **BRW Groundwater and Surface Water Monitoring**

During construction of the BRW ponds, the Responsible Parties have monitored both local wells and the Silver Bow Creek below its confluence with Blacktail Creek reach adjacent to the BRW. The Group 1 and Group 2 Responsible Parties shall continue to monitor both water levels and metals concentrations throughout



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

the remainder of the year in the same manner to evaluate the effectiveness of the grading plan and report all monitoring results and data to EPA and DEQ upon collection. Based on this data, the Responsible Parties and EPA and DEQ shall meet in the fall of 2011 and EPA shall determine and order further remedial actions associated with the BRW area in 2012.

**Current 2019 Status: The initial purpose of this monitoring was to test and determine the capture effectiveness of the HCC and BRW ponds. The investigation of the area between capture systems maintained the monitoring program until 2018. Remaining monitoring has been assimilated into and is conducted under the BRW Phase I Investigation QAPP.**

**Monitoring by the SDs continued past 2018 and shall continue as a part of the BRW Smelter groundwater pre-design investigation. For ongoing and further remedial requirements regarding this monitoring, see Attachment B.1, Section 2.4.4 and Attachment C Section 6.**

**Abandoned Aqueduct**

Group 1 and Group 2 Responsible Parties shall determine potential impacts from material in and under the abandoned aqueduct. The material located in the abandoned aqueduct could be mobilized and transported to the creek during elevated stream conditions and affect surface water quality. A report about this material shall be submitted by the Group 1 and Group 2 Responsible Parties by September 30, 2011. Alternatives to be considered in this study range from no further action to removal of the aqueduct itself, its contents, or installation of sheet piling below the structure. The study will be evaluated by EPA and DEQ and a determination made in writing by EPA about the necessary actions shall be made in the winter of 2011-2012. The Group 1 and Group 2 Settling Defendants shall implement all required work in 2012.

**Current 2019 Status: Based on investigation of the ground water conditions related to the BRW ponds construction by the Respondents, it was determined that waste directly under that aqueduct was not as significant of a problem as the various other sources in the area. Ground water capture associated with the BRW ponds expansion partially addressed the aqueduct as a source and a report specific to the aqueduct was not completed. Later, the pore water investigation conducted by EPA identified ground water inflows to surface water in and near this area. The SDs further remedial requirements specific to the BRW GW capture system are described in Attachment C, Section 6.**

**Subdrain Groundwater Management Report**



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

The Group 1 and Group 2 Responsible Parties shall develop a Subdrain Groundwater Management Report under direction from EPA and DEQ. The report shall include information about the installation of infiltration barriers over tailings in the subdrain corridor, diversion of groundwater from the subdrain to the Berkeley Pit, and further subdrain groundwater interception and pumping system upgrades and other measures to optimize the operation of the subdrain. The report shall be submitted in draft form by the Group 1 and Group 2 Responsible Parties by October 15, 2011 to EPA for comment by EPA in consultation with DEQ. The final deliverable shall be submitted within thirty days of receipt of comments to EPA for review and approval by EPA in consultation with DEQ.

**Current 2019 Status: This area is now known as the BPSOU Subdrain. The BPSOU Groundwater Management Report, along with the appendices, was submitted to the EPA and DEQ in December 2014.**

**Elements of the Report may be incorporated, as appropriate, in future assessments and evaluations of the BPSOU Subdrain that SDs complete in satisfaction of the requirements described in Attachment B.1 Section 2.2.2.**

#### **Revised Groundwater Monitoring**

An Interim Groundwater Monitoring Plan for the alluvial aquifer, dated November 14, 2007 was completed by the Agencies and implemented by the PRPs for the alluvial aquifer to ensure that groundwater controls are effective; to provide additional information as necessary on the movement, quality, and quantity of groundwater; and to provide data for ongoing oversight of the groundwater remedy. EPA, in conjunction with DEQ, has modified the Groundwater Monitoring Plan to reflect current conditions and concerns. The modified plan, known as the Interim Revised Ground Water Monitoring Plan (EPA 2011) is attached to the PRI Work Plan as Appendix E. The Group 1 and Group 2 Responsible Parties, as described in the UAO, shall implement the plan as written, including the installation and development of additional wells as described in the plan. EPA may request and order changes to the monitoring system and the Interim Revised Groundwater Monitoring Plan as data are evaluated.

**Current 2019 Status: Additional monitoring wells were installed by the Respondents in 2011 and 2012. The 2011 interim groundwater monitoring plan has been updated or modified annually since 2011 and monitoring is ongoing. Annual data summary reports are submitted in the first half of the year following sample collection. In 2018, the interim groundwater monitoring plan was converted to a QAPP.**



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**SDs shall continue groundwater monitoring under an approved plan. For ongoing remedial and monitoring requirements for groundwater monitoring, see Attachment B.1 Section 2.2.1.**

### **3.4 Surface Water**

The existing catch basin structures within BPSOU shall continue to be operated and maintained to maximize effectiveness by the Group 1 Responsible Parties. EPA may direct upgrades or improvements to the existing facilities, and such directions shall be implemented by the Group 1 Responsible Parties.

#### **Slag Canyon Sediment Removal**

Substantial bank and near-stream contamination removal and associated reclamation by Responsible Parties has occurred under prior order amendments and EPA direction. In addition to the ongoing monitoring of loads entering Silver Bow Creek along the BRW described above and below, the Group 1 and Group 2 Responsible Parties shall evaluate the feasibility and effectiveness of removing sediments within Silver Bow Creek from its confluence with the subdrain downstream through the BRW area. In this evaluation, the Responsible Parties will make a recommendation to EPA on an effective means of addressing these sediments. This evaluation will be conducted throughout the remainder of 2011, and a summary report that addresses these sediments will be submitted to the agencies by October 15, 2012. The Responsible Parties shall implement sediment removal or mitigation actions as a result of the evaluation of this report, as directed by EPA in consultation with DEQ.

**Current 2019 Status: A sediment evaluation report was submitted by the Responsible Parties in 2012. The agencies provided comments of the report, but the report was not finalized. In 2016, EPA and NRDP separately collected sediment samples in the creeks at the site.**

**SDs shall address further remedial requirements for the contaminated in-stream sediments in the slag canyon/BRW area. See Attachment C, Section 6 for SDs' remedial requirements for contaminated sediments in this area.**

#### **Third Cycle Upfront Stormwater BMPs**

Since 2009, the Responsible Parties have implemented two cycles of upfront stormwater control best management practices to mitigate contaminated storm water run-off. These actions included the reclamation and revegetation of areas identified as contamination contributors to storm water runoff, initiation of stormwater system sediment cleanout activities on a periodic basis, the expansion and improvement of existing catch basins, and the initiation of a curb and gutter



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

program, among other things. These actions were conducted under order amendments and were consistent with the 2006 BPSOU ROD requirements for a yearly BMP program to address contaminated stormwater until in-stream ARARs are consistently met.

Since 2009, the Responsible Parties have also prepared a variety of preliminary evaluations that looked at how improvements or maintenance activities or other actions could enhance the overall performance of the existing storm water infrastructure and improve water quality within the BPSOU. The intent of these BMP evaluations is to improve water quality that discharges from the existing storm water infrastructure and other storm water sources into Silver Bow Creek below its confluence with Blacktail Creek. The BMP actions listed and required below (the Third Cycle Upfront Stormwater BMPs) are based on those evaluations and EPA's own determinations and experience, and describe the ongoing programs that shall be implemented by the Group 1 and Group 2 Responsible Parties, as well as any BMP actions that need to be further developed in order to control storm water runoff. The Group 1 and Group 2 Responsible Parties shall continue to evaluate the effectiveness of the storm water BMPs and determine if additional BMPs are necessary to meet the site ARARs as directed by EPA in consultation with DEQ.

**A. Clean out of the BSB Stormwater System**

This work includes the cleanout and/or repair of subsurface stormwater drain sections which are linked to hazardous substance releases or potential releases through stormwater events. The Group 1 and Group 2 Responsible Parties shall continue implementation of the sediment *Removal Plan for the Butte Silver Bow Municipal Stormwater System within the Butte Priority Soils Operable Unit* (May 2010), and complete the work for 2011 and 2012 as soon as practicable. These practices need to continue into the future to prevent buildup of sediment in the BSB infrastructure.

**Current 2019 Status: The plan was completed and the cleanout of the BSB stormwater system is an ongoing activity as part of the Superfund Stormwater Operations and Maintenance Plan.**

**SDs ongoing remedial element requirements for this activity are described in the BPSOU SOW Section 1.5 (e) and Attachment B.1 Section 2.4.5.**

**B. Illicit connections**

An evaluation of the existing storm water structures in the uptown Butte area was conducted during the fall of 2008 in the Butte Silver Bow Municipal Storm Water



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

System Improvement Plan. Numerous illicit sanitary sewer connections were located during the study. The Group 1 Responsible Parties shall continue to locate and repair all illicit sanitary sewer connections identified in the past or newly identified to the BSB stormwater system. All repaired illicit sanitary sewer connections shall be described in a report/deliverable and submitted to the EPA for review and approval in consultation with DEQ every three months during 2011 and 2012.

**Current 2019 Status: This activity was completed by Respondents in 2016.**

**C. The implementation of a curb and gutter program in Butte**

The Group 1 Responsible Parties shall continue full implementation of the Curb and Gutter Priority Plan for the Butte Silver Bow Municipal Stormwater System within the Butte Priority Soils Operable Unit (May 2010), and complete the work for 2011 and 2012 (and future years) as soon as practicable.

**Current 2019 Status: This activity was completed by the Respondents in 2013 and a construction completion report was approved by EPA and DEQ on May 19, 2014.**

**D. The construction of stormwater catch basins at the base of Buffalo Gulch**

A catch basin or more than one catch basin shall be constructed by the Group 1 and Group 2 Responsible Parties at the base area of Buffalo Gulch. These may include the purchase and development of catch basins on McDonough (BG-01), Lisac (BG-01) and/or WL-12 properties. The Group 1 and Group 2 Responsible Parties shall use best efforts to obtain these properties to build the largest catch basins possible in the area. Atlantic Richfield Company owns the land that WL-12 is proposed to be built on and discussions are ongoing for the purchase of other areas. A draft Buffalo Gulch Catch Basin(s) draft remedial action work plan shall be submitted to EPA and DEQ for review and comment by EPA no later than September 30, 2011. A final deliverable shall be submitted to EPA and DEQ within thirty days of receipt of comments for approval by EPA in consultation with DEQ. Catch basin work approved by EPA shall be installed in Buffalo Gulch in 2012.

**Current 2019 Status: This activity was not implemented under the UAO WP, but will be completed under the Consent Decree.**

**SDs further remedial requirements regarding this basin are described in Attachment C, Section 2. EPA expects the Railroad respondents will be obligated to construct or facilitate the construction of the improvements that are part of the remedial requirements located on property owned by the Railroad responsible parties under a separate enforcement mechanism.**



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**E. Hydrodynamic Devices**

The Group 1 and Group 2 Responsible Parties shall construct the following Hydrodynamic Devices described in the Draft Plan for Third Cycle Best Management Practices (April 2011) as modified by direction from EPA:

- Texas Avenue. This hydrodynamic device shall be installed in 2011. It will be a 10-year design flow device.
- Warren Avenue. This hydrodynamic device shall be installed in 2011. It will be a 10-year design flow device.
- Anaconda Road. This hydrodynamic device shall be installed in 2012. It will be a 10-year design flow device.
- Montana Street. This hydrodynamic device shall be installed in 2012. It will be a 10-year design flow device.
- Buffalo Gulch. These hydrodynamic devices are located at the bottom of Buffalo Gulch. One shall be located on the corner of Holland and Main Street and the other on the corner of Front and Dakota Street and will be 2-year design flow devices.
- These shall be installed with the catch basins in 2012.

**Current 2019 Status: The device to be located at Front and Dakota Street was not required. Installation of the other listed hydrodynamic devices was completed by the Respondents between 2012 and 2014, and a construction completion report was approved by the EPA and DEQ. The devices are being maintained in accordance with the approved Superfund Stormwater System Operations and Maintenance Plan.**

**SDs ongoing O&M requirements for these actions are described in the BPSOU SOW Section 1.5 (e) and Attachment B.1 Section 2.4.5.**

**F. BSB Street Maintenance and Snow Management Plan**

The Group 1 Responsible Parties shall develop a comprehensive street maintenance and snow management plan for the BPSOU that will cover issues such as snow removal and storage, heavy metal sampling of sand before it is used on the streets, street cleaning and the use of water to prevent dust problems from potentially contaminated dirt on city streets. The workplan/deliverable shall be submitted to EPA for review and approval by EPA in consultation with DEQ by September 30, 2011. This plan shall be completed by the November 2011 and implemented thereafter.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**Current 2019 Status: The Respondents submitted a draft Street maintenance and Snow Management Plan to EPA and DEQ on June 11, 2018. EPA and DEQ provided comments on the plan on August 18, 2018. Agency review and approval of the revised plan is anticipated.**

**The SDs ongoing O&M requirements regarding these activities are described in the BPSOU SOW Section 1.5 (e) and Attachment B.1 Section 2.4.6.**

**EPA Oversight of BSB Municipal Activities**

EPA and DEQ recognize that the curb and gutter and stormwater system improvement actions described above overlap with BSB's municipal functions. EPA and DEQ will cooperate with BSB in its oversight and approval of BSB actions in these situations to ensure that duplicate reporting or inconsistent obligations are avoided to the extent practicable. EPA and DEQ's oversight of these actions pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, does not extend to municipal actions which do not address the release or potential release of hazardous substances, such as stormwater system improvement actions outside of the Butte Site boundaries.

**G. Additional Source Controls**

Under the Remedy, an unreclaimed, disturbed site that does not exceed lead or arsenic human health action levels shall still be addressed by the Group 1 Responsible Parties if data collection, including data collection under the surface water monitoring and BMP program, demonstrates that surface water contaminants of concern (i.e., copper and zinc) from the site are migrating off-site and impacting surface water quality in Silver Bow Creek below its confluence with Blacktail Creek, Blacktail Creek, or Grove Gulch Creek. If such sites are discovered by the Group 1 Responsible Parties, remedial actions for these sites shall be designed in a workplan/deliverable submitted to EPA and DEQ and implemented as approved by EPA. The action to be implemented will be determined during review of a proposed work plan, but is anticipated to be consistent with previous source area actions completed in BPSOU. These sites shall also be evaluated and maintained over the long-term in accordance with the BRES, the Butte Hill Revegetation Specifications, and site-specific design plans.

Specifically, EPA, in consultation with DEQ, has determined that the following list of sites along with their current status shall be part of the Third Cycle stormwater BMP action under the Remedy.

- New and Mahoney Street. The property owner is in the process of developing a portion of this site. The Group 1 Responsible Parties shall oversee the



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

development of the property and ensure the contamination up gradient of the site is addressed. A CCR for the site shall be submitted to EPA and DEQ 3 months after completion of these activities.

- 800 North Main. The Group 1 Responsible Parties shall develop a workplan for this site in 2011. EPA, in consultation with DEQ, shall review and approve the workplan/deliverable. Remediation activities shall be completed by the end of 2012. A CCR for the site shall be submitted 3 months after completion of these activities.
- The Group 1 Responsible Parties prepared a draft technical memorandum on Additional Source Control and Engineering Sediment Control BMPs in May 2010. This evaluation presented a number of additional source control erosional areas that could benefit from mitigation. Twenty sites were identified and shall be addressed under a work plan/deliverable to be submitted to EPA for review and approval in consultation with DEQ as soon as practicable. Figure 1 of the PRI Work Plan shows the location of the source control areas to be addressed under this work. Potential mitigation for these sites includes soil caps, rip-rap lined ditches, rock check dams, vegetated swales, concrete chutes, sediment traps, traffic barriers, silt fences, tailings removal, membrane lined ditches, and protection under the BSB storm water ordinance. Three of the source control sites are located on railroad property, and shall be addressed under the O&M Plan or other specifically approved plans for those properties by the Group 2 Responsible Parties. Construction activities for these twenty sites shall begin in 2011 and shall be completed in 2012. Construction Completion Reports (CCRs) shall be submitted 3 months after completion of these activities.

**Current 2019 Status: The SDs are currently working on the New and Mahoney and the Anderson Shaft sites remedial designs which are subject to EPA review and approval in consultation with DEQ under the UAO and its PRI Work Plan or under the Consent Decree and the BPSOU SOW. It is anticipated that these sites will be reclaimed in 2019/2020. The 800 North Main and the twenty sites referenced above have all been reclaimed/addressed and are now part of the BRES program.**

**SDs ongoing remedial and O&M requirements regarding these activities are described in the BPSOU SOW Section 1.5 (e) and Attachment B.1 Sections 2.1.2 and 2.4.5.**

### **3.5 Groundwater Treatment Facility and Related Facilities**

As noted above, the 2006 BPSOU ROD requires the continued operation of West Camp capture and pumping structures, the Butte Treatment Lagoons facility and



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

the hydraulic control channel (HCC) for the treatment of captured ground and surface water in accordance with ARARs and any approved or applicable plans. The West Camp facilities, the Butte Treatment Lagoons facility and the HCC shall continue to be operated and maintained in as effective and efficient manner as possible by Responsible Parties such that Performance Standards are obtained under a variety of conditions for end of pipe discharges. Monitoring and data reporting under existing plans and understandings for the discharge shall continue.

In addition, the 2006 BPSOU ROD requires the re-design and upgrade of the Butte Treatment Lagoons facility. That remedial design action has been ongoing. The following actions are required of the Group 1 and Group 2 Responsible Parties for the 2011 and 2012 seasons.

**Phase I—2011 Construction**

- The existing West Camp Pump Station shall be upgraded. Work will include a new, larger precast concrete pump station building with new interior piping, valves and control system. A permanent diesel fired generator shall be installed to provide electrical power during outages, and a new electrical panel shall be installed. The existing well shall be retrofitted with a pitless adaptor and the existing above ground piping between the well and the control building shall be replaced with below grade piping. A new submersible pump shall be installed controlled by a new variable frequency drive.
- Eight treatment lagoon outlet structures shall be upgraded. All metal wing walls, handrails and exposed piping shall be repainted. Any metal wing walls requiring substantial repair due to corrosion shall be replaced with concrete structures. Existing screw operated slide gates shall be replaced with corrosion resistant guide channels and stop logs. Existing metal stop logs shall be replaced with synthetic stop logs. All deteriorated concrete structures shall be repaired or replaced. Existing silt curtains shall be replaced, and new silt curtains will be installed to optimize flow within the treatment lagoons. Permanent silt curtain anchors shall be installed and a means of measuring water elevation differential across each curtain shall be provided. Instrumentation will be upgraded for monitoring.
- The existing Automatic Sampling Building and Effluent Station shall be replaced. A new precast concrete sampling building will be constructed and a below grade effluent metering vault shall be installed. New sampling equipment shall be installed, and the instrumentation and control system shall be upgraded.
- A new Influent Pump Station shall be constructed and include a heated building to house the new pumps, piping, valves, flow meters, instrumentation and



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

controls. A new inlet structure shall be constructed, and the existing inlet structure and pump station left in place for backup. Two new influent pipelines shall be constructed between the pump station and the CAS building. A dedicated diesel generator shall be installed to provide backup power during outages.

All of this Phase 1 work is described and addressed in *the Final Butte Treatment Lagoons (BTL) and West Camp Pump Station (WCP-1) Upgrades Design Report/Work Plan* (, May 12, 2011), which was approved by EPA and DEQ and which is incorporated herein by reference.

### **Phase II—2012 Construction**

The Phase 2 work described below shall be addressed under a remedial action work plan submitted by the Responsible Parties. The draft work plan shall be submitted to EPA and DEQ for comment by the October 30, 2011. A final workplan/deliverable shall be submitted for review and approval by EPA in consultation with DEQ within thirty days of receipt of comments or as otherwise approved by EPA. A Final Phase II LAO Butte Treatment Lagoons facility and related facilities Remedial Action Plan shall be completed and approved by March 30, 2012.

- At the Butte Treatment Lagoons (BTL) facility, site utility improvements shall include a new potable water line, fire hydrants and sewage force main to service the planned Operation Building. Capacity of the existing effluent pump station electrical service will be increased to serve the new Influent Pump Station.
- The existing Chemical Addition System (CAS) shall be upgraded. Design information for all equipment will be provided, including specific capacities for all tanks, mixers, and lime handling equipment. An addition to the existing building shall be constructed. Improvements to the interior shall improve service life and ease maintenance. Lime feed equipment will be upgraded to provide redundancy and reliability. Either a portable lime tank or a second lime silo shall be provided. Compressed air shall be piped in from the new Operations Building when it is built, and the existing compressor removed. New influent piping shall be constructed, and the existing interior piping replaced. A connection to the new potable water line shall be made. The existing sluice box shall be replaced, and a new distribution tank constructed. All three distribution channels between the CAS building and the treatment lagoons shall be replaced with precast concrete channels. Instrumentation and controls shall be upgraded.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- Access roads serving the BTL area shall be generally improved. Gravel roads along the dikes shall be graded, and resurfaced with gravel. The Operations Building and CAS road and parking lot shall be paved. Signage and traffic control shall be updated.
- A new Operations Building shall be constructed to provide operator office and lab space, as well as heated maintenance and storage space. A new control center shall be installed and be connected to an extensive network of monitoring points. A dedicated diesel generator shall be installed to provide electrical power during outages.
- The following long-term plans shall be prepared as part of the Final Phase II LAO Butte Treatment Lagoons Facility Remedial Action Plan:
- Water Management Plan will address the treatment system design basis with a breakdown of incoming flows, detailed treatment capacity, detailed online storage volumes, off-line storage capacity, off spec water management, and alternate modes of operation.
- Sludge Management Plan will address sludge removal, sludge handling, dewatering and disposal. The plan will include specific design information on all structures and equipment.
- Instrumentation, Controls and Monitoring Plan will provide complete design information for all existing and new systems.
- Construction Report for the recent MSD Pump Vault upgrades and will include specific information for all installed equipment and control.

**Current 2019 Status: The Phase I and II construction activities were completed by the Respondents in 2014 and a construction completion report was approved by the EPA and DEQ on October 29, 2014.**

**SDs are developing the operation and maintenance, and monitoring plan (OMM) for review and approval by EPA in consultation with DEQ. The OMM Plan will include the water management, sludge management and instrumentation, controls, and monitoring plans.**

**SDs ongoing O&M requirements for this facility are described in the BPSOU SOW Section 1.5 (e) and Attachment B.1 Section 2.4.4.**

### **3.6 Surface Water Monitoring**

The Responsible Parties shall continue to implement the Interim Surface Water Monitoring Interim Monitoring Plan (EPA, April 2007). In addition, the following



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

actions shall be taken in addition to those described in the April 2007 monitoring plan:

- EPA or DEQ may require opportunistic wet weather sampling and monitoring upon notice and such sampling and monitoring shall be implemented as requested;
- Automated wet weather sampling for station SS-06A shall be set up to collect individual samples every hour for 24 hours; and
- SS-01 is added to this list of required sampling stations.

All data results shall be reported as directed by EPA and as stated in the 2007 Interim Surface Water Monitoring Plan. EPA and DEQ will develop a final Surface Water Monitoring Plan for implementation at a later date.

**Current 2019 Status: The surface water monitoring program continues to be implemented. Under the UAO WP, the Respondents provided EPA and DEQ annual surface water data summary reports (DSR) for review and approval. The DSRs include all normal and wet weather flow, along with diagnostic sampling results. Furthermore, the Respondents submitted an interim Surface Water QAPP that was approved by the EPA and DEQ on June 11, 2018. The SWMP is Exhibit 1 to Attachment A of the BPSOU SOW.**

**Under the Consent Decree, the Final Surface Water QAPP will be reviewed and updated annually and resubmitted to EPA for review and approval. SDs ongoing surface water monitoring requirements are described in the BPSOU SOW Section 1.5 (c) and Attachment B.1 Section 2.3.1.1.**

### **3.7 Other Remedial Requirements**

#### **Butte Mine Waste Repository**

The Group 1 Responsible Parties shall ensure that remediation waste management activities at the Butte Mine Waste Repository are implemented in compliance with the approved Butte-Silver Bow County BPSOU Mine Waste Repository Operations and Maintenance Plan, June 2009.

In addition, the Group 1 Responsible Parties shall construct a new repository cell within the GMMIA boundary. The draft remedial design/draft remedial action report describing this construction shall be submitted to EPA and DEQ for comment by March 31, 2012. A final workplan/deliverable shall be submitted within thirty days of receipt of comment for approval by EPA in consultation with DEQ. The repository shall be constructed in 2012. All future repository cells used to contain mine wastes from the BPSOU shall be closed in a manner consistent with



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

the initial repository closure, according to site-specific design plans, and shall comply with all pertinent ARARs. Closed repositories shall be evaluated and maintained over the long-term in accordance with the BRES, the Butte Hill Revegetation Specifications, and project-specific O&M plans. The Butte Mine Waste Repository O&M plan shall be submitted to EPA and DEQ for review and approval by EPA in consultation with DEQ no later than 30 days prior to the completion of any closure activities at the repository.

If it is determined by EPA, in consultation with DEQ, that Superfund waste cannot be disposed of in the Butte Mine Waste Repository because it is waste regulated under RCRA or the State equivalent of RCRA, or is otherwise not appropriate for disposal at the Butte Mine Waste Repository, the Group 1 Responsible Parties shall identify the names and locations of facilities where the waste materials will be shipped, the type and quantity of waste that will be generated and the method of transportation that will be used; and submit this information to EPA for review and approval, in consultation with DEQ.

**Current 2019 Status: As discussed above, the Butte Waste Repository was expanded in 2013 and a construction completion report on the expansion was submitted and approved by EPA in consultation with DEQ on November 23, 2015. The mine waste repository is being operated and maintained in accordance with the Mine Waste Repository Operations and Maintenance Plan that was approved by the EPA and DEQ in 2015.**

**SDs ongoing O&M requirements regarding this facility are described in the BPSOU SOW Section 1.5 (e) and Attachment B.1 Section 2.4.1.**

### **3.8 Institutional Controls**

The Group 1 and Group 2 Responsible Parties shall monitor and enforce, with adequate funding and planning, the ground water control area rule enacted by DNRC and any amendments thereto. The Group 1 and Group 2 Settling Defendants shall monitor and enforce, with adequate funding and planning, the 2011 BSB Storm Water Ordinance and any amendments thereto.

EPA will submit final comments, based on the public input received on the draft plan, to the draft Group 1 Institutional Control Plan in the summer of 2011. The Group 1 Responsible Parties shall revise the plan accordingly and submit a final Group 1 Institutional Control Plan within 60 days of receipt of the comments for final EPA approval. EPA and DEQ will submit comments on the Group 2 draft institutional control plan in 2011, and the plan shall be revised by the Group 2 responsible Parties accordingly.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

EPA and DEQ will work with the county and others to ensure that workable and adequate zoning controls and permit requirements are enacted and enforced. EPA and DEQ will continue to work with the Responsible Parties for the installation of appropriate signage and fencing as needs arise and after input from affected landowners.

**Current 2019 Status: See status description above.**

**A revised Institutional Control Implementation and Assurance Plan is attached to the Consent Decree as Appendix E.**

### **3.9 Operations and Maintenance (O and M)**

There are several short-term, EPA-approved O&M plans in existence for various actions within the BPSOU site. These plans shall continue to be implemented by the appropriate Responsible Parties until final O&M plans are approved by EPA in consultation with DEQ. The Remedy requires the development of long-term and integrated comprehensive monitoring and O&M plans for all aspects of the Remedy, and these shall be addressed as full remedial action is implemented. Interim O&M plans, as described below, shall be developed for review and approval by EPA in consultation with DEQ as described below. All approved O&M activities shall be implemented by the Responsible Parties as appropriate.

The Residential Metals Abatement Program Plan and the IC Plans have or will have long term implementation elements included within those plans and do not require separate O&M plans.

During the O&M period, Responsible Parties as appropriate shall submit quarterly O&M data reports and an annual O&M report to document and evaluate the operation and performance of the system(s), including performance monitoring results, unless otherwise noted in this UAO.

**Current 2019 Status: See status description for O&M plans above.**

#### **Railroad O&M**

This plan by the Group 2 Responsible Parties shall address the areas remediated or capped on railroad property and shall include any catch basins or waste repositories on such land. The draft Interim Group 2 Railroad O&M plan shall be submitted to EPA and DEQ for review and comment within 30 days of the effective date of the UAO. A final Interim Group 2 O and M Plan/deliverable shall be submitted to EPA and DEQ by the Group 2 Responsible Parties within 30 days of receipt of comments for approval by EPA in consultation with DEQ. The plan shall include the date certain for transfer of certain waste repository land previously identified to BNSF



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

to Butte Silver Bow County (which was a condition of the original waste repository approval construction) or for the removal of such wastes from the repository to a new, approved repository.

**Current 2019 Status: The Group 2 Respondents submitted an interim stormwater O&M plan that was approved by the EPA. The Railroads are also in the process of developing an O&M plan for remediated and capped areas that are located on Railroad Properties.**

**Ongoing remedial and O&M requirements for the Group 2 Respondents will be addressed in a separate compliance document and are not included in the Consent Decree.**

**Ongoing O&M requirements for remediated railroad properties owned by RARUS are described in the BPSOU SOW, Attachment B.1 Section 2.4.7.**

**BTL, West Camp, and MSD Groundwater Capture System O&M**

The draft Interim BTL System, West Camp, and MSD Groundwater Capture System O&M plan was submitted by Group 1 and Group 2 Responsible Parties to EPA and DEQ for review and comment. A final Interim BTL System and MSD Ground Water Capture system O&M Plan/deliverable shall be submitted to EPA and DEQ for approval by EPA in consultation with DEQ within thirty days of receipt of comments by EPA or as otherwise indicated by EPA.

**Current 2019 Status: See status description above.**

**Interim Stormwater Ponds and Engineering Controls O&M**

This plan shall address all stormwater ponds and stormwater engineered structures within the Butte Site. The plan shall also address any other stormwater BMP components if those components are not addressed under other O&M plans (such as source area plans) or municipal operation plans. The draft Stormwater Ponds and Engineering Controls O& M plan shall be developed and submitted to EPA and DEQ for review and comment by EPA in consultation with DEQ by December 15, 2011. A final such plan/deliverable shall be submitted within thirty days of receipt of comments by Group 1 and Group 2 Responsible Parties for approval by EPA in consultation with DEQ.

**Current 2019 Status: See status description above.**



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**3.10 2011 UAO PRI Work Plan Appendices**

Appendix A – Soil, Groundwater, and Surface Water Performance Standards

**2019 Status: In-stream Surface Water Performance Standards have been modified as described in the Surface Water Compliance Determination Plan, Attachment A to the BPSOU SOW.**

Appendix B – Butte Site and BPSOU Map

**2019 Status: A current Figure of the BPSOU Surface Boundary is attached to the Consent Decree as Appendix B.**

Appendix C – Schedule

**2019 Status: The approved integrated schedule for RD/RA activities is found in Exhibit 1 of the BPSOU SOW, and in Table 2-1 of Attachment B.1 of the BPSOU SOW.**

Appendix D – EPA November 8, 2008 letter on snow disposal

**2019 Status: As noted above, issues regarding BSBC snow removal have been addressed under the prior UAO activities.**

Appendix E – Revised Interim Ground Water Monitoring Plan, 2011

**2019 Status: As noted above, the 2011 Ground Water Monitoring Plan has been revised and is now a QAPP.**

Figure 1 – Source Control Area Map

**2019 Status: The current Source Areas Map is attached to the Consent Decree as Appendix G.**



**ONGOING REMEDIAL ELEMENTS SCOPE OF WORK**

**BUTTE PRIORITY SOILS OPERABLE UNIT  
of the  
SILVER BOW CREEK / BUTTE AREA SUPERFUND  
SITE**

**Butte-Silver Bow County, Montana**

**ATTACHMENT B.1 TO APPENDIX D  
TO THE CONSENT DECREE**



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION .....</b>	<b>1</b>
<b>2.0</b>	<b>MAJOR BPSOU ROD COMPONENTS.....</b>	<b>1</b>
2.1	Solid Media.....	1
2.1.1	Residential Contamination .....	1
2.1.2	Non-Residential Solid Media and the Butte Reclamation Evaluation System (BRES).....	2
2.1.2.1	Non-Residential Solid Media.....	2
2.1.2.2	BRES Program.....	3
2.2	Groundwater .....	4
2.2.1	Groundwater Management Plan.....	4
2.2.1.1	Site-Wide Groundwater Monitoring .....	5
2.2.1.2	Controlled Groundwater Area Monitoring .....	6
2.2.1.3	Butte Treatment Lagoons, West Camp, and BPSOU Subdrain Groundwater Capture System Operations, Maintenance, and Monitoring.....	7
2.2.2	BPSOU Subdrain Groundwater Management Report.....	8
2.2.2.1	Evaluation of the BPSOU Capture and Conveyance System Performance .....	9
2.2.2.2	Localized Groundwater Study .....	12
2.3	Surface Water .....	12
2.3.1	Surface Water Management Plan .....	13
2.3.1.1	Surface Water Monitoring .....	13
2.4	Operations and Maintenance Plans.....	15
2.4.1	Mine Waste Repository.....	15
2.4.2	GMMIA .....	16
2.4.3	Syndicate Pit .....	16
2.4.4	BTL, West Camp and BPSOU Subdrain GW Capture and Treatment System.....	16
2.4.5	Stormwater Structures O&M Plan .....	17
2.4.6	BSBC Street Maintenance and Snow Management Plan.....	17
2.4.7	RARUS Properties O&M Plan .....	17
2.5	Document Submittal and Review Process.....	17
2.6	Project Deliverables and Schedule .....	18

## LIST OF TABLES

Table 2-1 RD and RA Schedules for the Ongoing Remedial Elements



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **1.0 INTRODUCTION**

This Ongoing Remedial Elements Scope of Work, Attachment B.1 to the BPSOU Statement of Work (SOW) (hereinafter Attachment B.1) outlines, as of August 2019, the remaining remedial elements for the 2006 Butte Priority Soils Operable Unit (BPSOU) Record of Decision (EPA 2006) as modified by the 2011 BPSOU Explanation of Significant Differences (ESD) (EPA 2011) and the 2020 Record of Decision Amendment, and as described in the 2011 Partial Remedy Implementation Work Plan (PRI Work Plan), an updated version of which is attached to the BPSOU SOW as Attachment B. This Attachment B.1 describes remedial design, remedial action and operations and maintenance activities that are required for completing the 2011 PRI Work Plan requirements, as modified.

As noted below and in Attachment B, the remediation required by the 2006 BPSOU Record of Decision as modified by the 2011 BPSOU ESD and the 2020 Record of Decision Amendment has not been fully implemented or completed for all components. This Attachment B.1 represents the current description of Work elements needed for full implementation of the 2011 PRI Work Plan as modified. The Further Remedial Elements Scope of Work Attachment, which is Attachment C to the BPSOU SOW, describes additional Remedial Action required for completion of the ROD implementation.

## **2.0 MAJOR BPSOU ROD COMPONENTS**

The major components addressed in the 2011 PRI Work Plan are as follows:

- Solid Media
  - Residential Contamination
  - Non-Residential Solid Media and the Butte Reclamation Evaluation System
- Groundwater
- Surface Water
- Other Remedial Elements
- Institutional Controls
- Operations and Maintenance

A more complete description of the components is found in the 2006 BPSOU Record of Decision and the 2011 BPSOU Explanation of Significant Differences (ESD).

### **2.1 Solid Media**

#### **2.1.1 Residential Contamination**

The Residential Contamination component of the ROD, otherwise known as the Residential Solid Media Remedial Action (which is implemented through the Residential Metals Abatement Program plan (RMAP) as of the Effective Date of the Consent Decree (CD)), is not addressed in the BPSOU SOW or in the Consent Decree. The EPA will use other enforcement mechanisms to implement this component of the ROD.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

### **2.1.2 Non-Residential Solid Media and the Butte Reclamation Evaluation System (BRES)**

Subject to Section 2.1.1 above, all solid media contaminated by historical mine waste sources within the BPSOU containing concentrations of arsenic, lead, or mercury above the respective action levels as described in the ROD shall continue to be addressed in the manner described in the BPSOU SOW and its Attachments B.1 and C. Also, source areas that do not exceed action levels shall be addressed if diagnostic monitoring performed as part of the surface water management and BMP program indicates that the source area contributes metal contaminant loads to receiving surface waters during wet weather runoff conditions or unacceptable impacts or impairment of the function of the stormwater BMPs is confirmed. The Butte Reclamation Evaluation System (BRES) establishes the vegetation, weed, and erosion Performance Standards for all completed solid media response actions under the Remedy except residential yards, playgrounds and other areas addressed by the Residential Solid Media Remedial Action. The BRES system is specifically designed for use in the upland environment of Butte.

#### **2.1.2.1 Non-Residential Solid Media**

Solid media contaminated by historic mine waste sources located in non-residential areas at the BPSOU include waste rock piles, milling wastes, smelter wastes, and contaminated soils. The ROD requires that all such source areas exceeding action levels for arsenic, lead and mercury within the BPSOU be identified and addressed. In addition, if an unreclaimed, disturbed site does not exceed lead or arsenic action levels, it may still be reclaimed if stormwater from such site is not managed by BMPs constructed as part of the remedy, all as provided in Attachment C to the BPSOU SOW. Most known source areas within the BPSOU have been reclaimed and additional capping and reclamation requirements are contained in Attachment C to the BPSOU SOW, Sections 7 and 8. However, there are areas within the BPSOU that have not been characterized or have changed conditions such that recharacterization is necessary. The ongoing remedial elements for non-residential solid media are:

1. *Plan and QAPP* – The Solid Media Management Plan (SMMP) and associated QAPPs, which describes the full non-residential solid media program, shall be completed by the SDs and submitted to EPA within 90 days of the Effective Date for review and approval, in consultation with DEQ, to provide for the sampling and characterization of areas inadequately studied, newly discovered sites, and provide a new sediment decision logic for sites which may pose unacceptable storm water concerns.
2. *Schedule for implementation* – The schedule for implementing the work, as well as logic diagrams for execution, shall be provided in the SMMP.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

3. *Data Summary Reports* – Sampling by the SDs for remedial design/remedial action for sites/areas shall be documented through periodic DSRs.
4. *Corrective Action Plans* – Once sample collection and information gathering activities are completed and it has been determined by EPA in consultation with DEQ that further action at sites/areas is necessary, a Corrective Action Plan (CAP) shall be prepared by the SDs and implemented upon approval by EPA in consultation with DEQ.
5. *Construction Completion Reports (CCR)* – Implemented cleanups shall be documented by the SDs through CCRs, as required.
6. *Long-Term Database* – Development of a long-term database for all non-residential media by the SDs shall be described in a DMP, referenced in the SMMP and implemented by the SDs.

#### **2.1.2.2 BRES Program**

To accommodate the diverse land types and end land uses within the BPSOU, the BRES (see attachment E to the 2006 Record of Decision) was designed to address reclaimed uplands in residential, recreational, and commercial/industrial land settings, excluding residential yards. The system has components that allow it to be applied to areas reclaimed as open space within this urban setting. Reclaimed areas, including cover soil caps, must achieve and maintain the performance standards described by EPA in the BRES document. The system also sets corrective action “triggers” based on the periodic monitoring and evaluation of response action sites. The triggers noted in the BRES require corrective action in a timely and appropriate manner in accordance with the scheduling requirements of the BRES. The BRES Program, including the development of schedules and corrective action plans where necessary to address historic mine waste source materials, continues to be implemented.

The 2006 BRES implementation documents shall be revised and approved by EPA and DEQ, as part of the SMMP, in order to incorporate optimization techniques, new technologies and lessons learned from implementing the BRES procedures.

All reclaimed areas, including cover soil caps, must achieve the performance standards described by EPA in the BRES document. The remedial elements for the BRES program are:

1. *Plan and QAPP* – The BRES Plan, associated BRES Manual and associated QAPP, which are part of the SMMP, shall be submitted to EPA within 90 days of the Effective Date, for review and approval, in



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

consultation with DEQ, for the continued implementation of the BRES program, including training of the field team on the BRES procedures, evaluation of reclaimed sites, reporting of field data, development of corrective action plans, implementation of corrective action plans and annual summary reports. The BRES plan and QAPP shall be reviewed and revised as necessary on an annual basis. The activities described in the BRES Plan shall be implemented by the SDs.

2. *Schedule for implementation* – The schedule for implementing the work shall be provided in the revised BRES Plan.
3. *Data Summary Reports (DSRs)* – DSRs in the BRES program include BRES Field Data Summary Reports and Technical Recommendations reports and shall be submitted to EPA and DEQ by the SDs.
4. *Corrective Action Plans* – After a BRES inspection, if it determined that a site's deficiencies require further, a CAP shall be prepared, approved by EPA in consultation with DEQ, and implemented by the SDs.
5. *Construction Completion Reports* – Implemented corrective actions shall be documented through CCRs.
6. *Long-Term Database* – Development of a long-term database shall be described in a DMP and referenced in the revised BRES plan.

## 2.2 Groundwater

The Remedy requires the capture and treatment of contaminated groundwater to the extent described in this Attachment B.1 and in Attachment C to the BPSOU SOW. The 2006 BPSOU Record of Decision contained a waiver of ARAR standards for the alluvial groundwater within the defined technical impracticability (TI) Waiver Area described in the 2006 BPSOU Record of Decision. In a letter dated October 22, 2019, EPA and DEQ approved SDs' revised points of compliance (POC) well analysis for monitoring the contaminated alluvial groundwater plume to support compliance with ROD requirements regarding the plume. Data collection to support EPA's review, in consultation with DEQ, of the TI boundary described in the 2006 BPSOU ROD and to establish new POC wells is ongoing. The Remedy will not and is not intended to clean up groundwater to meet groundwater performance standards within the boundary of the waived standards. Therefore, there are no Performance Standards for groundwater within the area of the BPSOU alluvial aquifer that is covered by the groundwater TI waiver boundary. Groundwater Performance Standards identified in the ROD must be met outside of the TI boundary as determined by monitoring in the revised points of compliance wells to be established as described above.

### 2.2.1 Groundwater Management Plan

The Groundwater Management Plan (GWMP) is the overall plan for how to address groundwater monitoring requirements identified in the 2006 Record of Decision, 2011 ESD, and 2020 Record of Decision amendment. The GWMP also describes how the overall remedial action approach meets the groundwater remedy specified in the ROD. The GWMP shall addresses



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

the Site-Wide Groundwater Monitoring Program, the Controlled Groundwater Area Program, the Butte Treatment Lagoons Monitoring Program and the Groundwater Flow Monitoring for the BPSOU Subdrain. The ongoing remedial elements for the Groundwater Management Plan are:

1. *Complete Plan* – Within 90 days of the Effective Date, SDs shall submit a draft GWMP for review and comment by EPA in consultation with DEQ. A final GWMP in response to agency comments is subject to comment, review and approval by EPA in consultation with DEQ. It is anticipated that this plan shall be reviewed and updated annually. SDs shall implement all activities described in the approved GWMP.

#### **2.2.1.1 Site-Wide Groundwater Monitoring**

An Interim Groundwater Monitoring Plan for the alluvial aquifer was first prepared in 2007 and was implemented by the UAO Respondents for the alluvial aquifer to ensure that groundwater controls are effective; to provide additional information as necessary on the movement, quality, and quantity of groundwater; and to provide data for ongoing oversight of the groundwater remedy. A modified plan, known as the Interim Revised Ground Water Monitoring Plan (EPA 2011) was issued and approved in 2011 and included the installation and development of additional wells. Since 2011, EPA has required the UAO Respondents to periodically modify the Interim Groundwater Monitoring Plan to reflect current conditions and concerns. The site-wide groundwater monitoring is ongoing. The outstanding remedial elements for ongoing site-wide groundwater monitoring are:

1. *Groundwater QAPP* – In 2018, the interim monitoring plan was converted to a QAPP format and approved by EPA in consultation with DEQ on June 13, 2018. The site-wide groundwater monitoring QAPP specifies the SDs responsibilities for sampling of performance wells, irrigation and domestic wells, 5-year review wells and Point of Compliance Wells (i.e., TI boundary determination wells). The Site-wide Groundwater Monitoring QAPP shall continue to be implemented by the SDs. This QAPP shall be reviewed and updated annually by the SDs, and SDs shall submit the Groundwater Monitoring QAPP for review and approval in accordance with Section 2.6. Such updates may include sampling by the SDs of groundwater monitoring wells installed by the Montana Natural Resource Damage Program pursuant to the Parrot Tailings Mine Waste Removal Project, as required by EPA in consultation with DEQ. The EPA may approve a separate standalone QAPP for the sampling of domestic and irrigation wells associated with the Controlled Groundwater Area (see Section 2.2.1.2 below).



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

2. *Schedule for implementation* – The schedule for implementing the Work described in the Groundwater QAPP is provided in the Groundwater QAPP.
3. *Data Summary Reports* – Pursuant to the terms of the Groundwater QAPP, DSRs for the Site-Wide Groundwater Monitoring program shall be prepared annually by the SDs and submitted for review and approval by EPA, in consultation with DEQ.
4. *Recommendations Report* – Annually and in conjunction with the annual groundwater DSR, a technical recommendations report shall be prepared by the SDs. The report shall describe proposed changes to the monitoring program and will serve as the basis for the annual update of the Groundwater QAPP. SDs shall implement all approved changes resulting from this process.
5. *Compliance Comparison Report* – A comparison of the data to groundwater quality Performance Standards shall be prepared annually by the SDs.
6. *Long-Term Database* – Development of a long-term database for groundwater data shall be described in the Site-wide DMP, referenced in the GWMP and implemented by the SDs.

#### **2.2.1.2 Controlled Groundwater Area Monitoring**

As a required institutional control (IC), a controlled groundwater area for the alluvial aquifer TI zone and other areas of groundwater contamination in Butte was established by Butte Silver Bow County to prevent domestic use of the contaminated groundwater and provide for other controls for groundwater use. The groundwater control area IC was enacted by the State of Montana Department of Natural Resources on October 13, 2009. The ongoing remedial element for the controlled groundwater area monitoring is:

1. *Controlled Groundwater Area QAPP* – Controlled Groundwater Area monitoring may be included under the Groundwater QAPP or a standalone QAPP which shall be prepared by the SDs or review and approval by EPA in consultation with DEQ. It is anticipated that this QAPP shall be reviewed and updated annually.. Upon approval by EPA in consultation with DEQ, the Site-wide Controlled Groundwater Area QAPP or the stand alone QAPP shall continue to be implemented by the SDs.
2. *Schedule for implementation* – The schedule for implementing the work shall be provided in the Groundwater Management Plan.
3. *Data Summary Reports* – Sampling results for the Controlled Groundwater Area QAPP shall be documented by the SDs through periodic DSRs. Procedures will be developed for informing landowners of results from sampling and implemented by the SDs.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

4. *Corrective Action Plans* – Once sample collection and information gathering activities are completed and it has been determined by EPA that further action at sites/areas within the Controlled Groundwater Area is necessary, a CAP shall be prepared by the SDs and implemented upon approval by EPA in consultation with DEQ.
5. *Construction Completion Reports* – Implemented corrective actions shall be documented by the SDs through CCRs, as required.
6. *Long-Term Database* – Development of a long-term controlled groundwater area database by the SDs shall be described in the Site-wide DMP, referenced in the Groundwater Management Plan and implemented by the SDs.

**2.2.1.3 Butte Treatment Lagoons, West Camp, and BPSOU Subdrain Groundwater Capture System Operations, Maintenance, and Monitoring**

The Butte Treatment Lagoons (BTL) is designed to ensure that contaminated groundwater captured from Silver Bow Creek above its confluence with Blacktail Creek, Lower Area One (LAO), West Camp and other areas is treated to ARAR Performance Standards identified in Attachment A to the BPSOU SOW. The BTL design also ensures that the plant can be operated efficiently and effectively in a variety of conditions, and sludge disposal can occur in accordance with the ROD and ARARs. The BTL has undergone improvements to increase the reliability of the system including the addition of redundant pumps and pipes and an improved supervisory control and data acquisition (SCADA) electronic monitoring system to monitor and control operation of the treatment plant.

The BPSOU Subdrain extends from an area adjacent to the Butte Civic Center approximately 4,500 feet to about 800 feet east of the confluence of Silver Bow Creek and Blacktail Creek. It has been improved and upgraded by the SDs over the years. Contaminated alluvial groundwater continues to be captured by the BPSOU subdrain groundwater interception and pumping system (see Appendix C to the CD), such that monitoring results show that in-stream chronic surface water standards are met most of the time. The captured groundwater is pumped from the Subdrain terminal vault to the BTL facility at LAO. The captured and pumped water is treated by lime precipitation technology before being discharged to Silver Bow Creek. The Hydraulic Control Channel also captures contaminated groundwater in BPSOU and that water is also transmitted to the BTL for treatment. Finally, additional groundwater capture for transmittal to the BTL and subsequent treatment is described in Attachment C to the BPSOU SOW and shall be implemented.

The purpose of the West Camp facility is to maintain water levels below the critical water level and treat contaminated groundwater as required by the



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

2006 Record of Decision and the 2011 ESD. The West Camp facility is also an important ongoing remedy component to allow for the management of inflow to the BTL.

The remedial elements for BTL monitoring are:

Butte Treatment Lagoons, West Camp, and BPSOU Subdrain Groundwater Capture System Operations, Maintenance, and Monitoring Plan and QAPP – *In 2018, the Draft Final BTL Operation & Maintenance and Monitoring (BTL OMM) Plan was submitted by the SDs and EPA and DEQ submitted review comments on the document in December 2018. A Final BTL OMM Plan is due from the SDs and is subject to review and approval by EPA in consultation with DEQ. The BTL OMM Plan includes a monitoring QAPP as an appendix and shall be reviewed and updated annually by the SDs. Upon approval, the BTL OMM Plan shall be implemented by the SDs.*

1. *Schedule for implementation* – The schedule for implementing the work is provided in the BTL OMM Plan.
2. *Data Summary Reports* – DSRs for the BTL monitoring program shall be prepared quarterly by the SDs for submittal to EPA and DEQ, and an annual DSR shall also be prepared by the SDs and submitted to EPA and DEQ.
3. *Optimization Report* – As required by EPA, in consultation with DEQ, a technical optimization report of the system shall be prepared by the SDs upon EPA request. The report shall describe proposed changes to operations and the BTL OMM Plan, and the scope of such a report will be developed by EPA, in consultation with DEQ.
4. *Compliance Comparison Report* – In accordance with the requirements in the ROD, a comparison of the sampling of treated water discharged to Silver Bow Creek to Performance Standards shall be prepared annually by the SDs.
5. *Long-Term Database* – Development of a long-term database for BTL shall be described by the SDs in the Site-wide DMP, referenced in the BTL OMM Plan and implemented by the SDs.

### **2.2.2 BPSOU Subdrain Groundwater Management Report**

The Respondents were directed in the 2011 UAO to develop a BPSOU Subdrain Groundwater Management Report (a.k.a., MSD Subdrain Groundwater Management Report). However, due to further Work as part of the Remedy, as described in Attachment C, finalization of the report in its UAO specific scope, is not required. Instead, EPA requires a similar evaluation of the BPSOU capture and treatment system performance be completed, as described below. SDs may utilize relevant portions of the



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

submitted MSD Subdrain Groundwater Management Report in preparing and completing the performance evaluation as described below.

#### **2.2.2.1 Evaluation of the BPSOU Capture and Conveyance System Performance**

The BPSOU subdrain was installed by the SDs from 2003 through 2005 and has undergone upgrades to improve reliability. The system requires routine maintenance, and components will eventually need to be replaced. Implementation of the fourth and final Best Management Practices cycle including the Diggings East Stormwater Basin Area, Buffalo Gulch Stormwater Basin(s), and Northside Tailings/East Buffalo Gulch Area, all as described in Attachment C to the BPSOU SOW, and the Parrot Tailings Waste Removal project have the potential to affect the BPSOU subdrain capture and conveyance system. Following implementation of the Attachment C to the BPSOU SOW remedial elements, upon notice from EPA, the SDs shall evaluate the remedial performance of the BPSOU subdrain and BTL system to determine if any further upgrades or optimization to the existing systems are needed. EPA will identify the requirements for evaluation in consultation with DEQ. The data and analysis from the prior UAO required studies may be used in this effort, as appropriate.

The purposes of the evaluation are to:

1. Evaluate whether the system adequately manages the plumes of contaminated groundwater by preventing plume expansion and preventing the discharge of contaminated groundwater to surface water in Silver Bow Creek below its confluence with Blacktail Creek and Blacktail Creek leading to exceedances of surface water ARARs or negative impacts to the beneficial uses of the creeks;
2. Look for opportunities to optimize the system to manage the plume of contaminated groundwater including possible changes to methods or locations and further upgrades of groundwater collection and conveyance facilities;
3. Evaluate the reliability of the system and look for opportunities to simplify O&MM and improve reliability by adding redundant components;
4. Evaluate impacts of implementation of the technical elements on operation, effectiveness, and reliability of the system;
5. Look for opportunities to optimize the capture by reducing groundwater inflow to the BTL treatment system. This could include isolation of clean groundwater and a separate treatment technology for treating West Camp groundwater; and
6. Estimate remaining life of system components to be able to adequately prepare for replacement.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

In addition to the required technical elements, an additional investigation has been conducted by the SDs in the BPSOU subdrain area including ongoing groundwater monitoring, ongoing monitoring of the subdrain, and installation and monitoring of new wells in 2017. Experience of operating the system is also valuable knowledge that was not previously available. The new information shall be incorporated into the evaluation. As noted above, elements of the previous BPSOU Subdrain Groundwater Management Report may still be pertinent and valid and may be carried forward, but must be reviewed and updated as required by EPA in consultation with DEQ.

The subdrain component of the groundwater collection and treatment system requires routine maintenance and does not have complete redundancy. A persistent issue is the accumulation of iron precipitate in the pipe and subdrain gravel pack. If the subdrain fails or needs partial replacement, no systems exist to continue operations during repairs. Additionally, there is no method for managing groundwater collection if changes are needed to increase or reduce the rates or adjust the locations of collection.

The evaluation shall consider a variety of approaches to provide for reducing precipitate accumulation, allow for flow management, include redundant systems, overall optimization of the system, and to prepare for eventual component replacement. Consideration shall be given to:

1. Addition of secondary groundwater collection methods such as wells or replacement subdrain (e.g. evaluate the effectiveness of extraction wells);
2. Addition of a header system to the subdrain providing some control over the collection and routing of water;
3. Prevention of mixing iron-rich, low pH water with alkaline, higher pH water within the subdrain which causes precipitation of iron and plugging of system components;
4. Other components or procedures which address the issues identified in the section (e.g. BPSOU Subdrain Video Inspection); and
5. Other improvements to meet the purpose of this evaluation.

The ongoing remedial elements for the BPSOU capture and treatment system performance evaluation are:

1. *Scoping* – Scoping of the evaluation shall be conducted by the SDs with EPA and DEQ, prior to any new data collection, modeling analysis, or design.
2. *Work Plan and QAPP* - An evaluation work plan shall be prepared by the SDs and submitted in draft to EPA and DEQ for comment, which incorporates the results of scoping and presents objectives and goals of



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

the evaluation. If investigation is needed, a work plan for a pre-design investigation shall be submitted to EPA for review, in consultation with DEQ, consistent with Section 3.3 of the BPSOU SOW in coordination with the draft work plan. Within 60 days of the receipt of comments from EPA, the SDs shall submit a final work plan for EPA review and approval in consultation with DEQ. The work plan shall be implemented by the SDs upon EPA approval, and implemented in accordance with the schedule contained in the work plan.

3. *Schedule for implementation* – The schedule for implementing the Work shall be provided in the BPSOU capture and treatment system performance evaluation.
4. *Data Summary Report* – Sampling results for the evaluation shall be documented by the SDs through a DSR submitted to EPA and DEQ.
5. *Evaluation Report* - After completion of the activities described in the work plan by the SDs, the SDs shall submit a draft evaluation report, which shall contain the above described evaluation and contain recommendations for improving or optimizing the BTL and/or BPSOU Subdrain system, as appropriate and supported by the evaluation. The draft report is subject to comment by EPA in consultation with DEQ. Within 90 days of receipt of EPA comments on the draft report, the SDs shall submit a final evaluation report for EPA review and approval in consultation with DEQ. The final report shall contain approved recommendations for improvement or optimization.
6. *Optimization Report* – As required by EPA in consultation with DEQ, a technical optimization report shall be prepared by the SDs upon EPA request. The report shall recommend changes to BPSOU capture and treatment system performance evaluation, and the scope will be developed by EPA in consultation with DEQ. Such a report shall be submitted by the SDs in draft and is subject to comment by EPA in consultation with DEQ. A final BTL Optimization Report is due from the SDs within 60 days of the receipt of EPA comments made in consultation with DEQ. Final Optimization Reports are subject to review and approval by EPA in consultation with DEQ.
7. *Design and Implementation of Recommendations* – Following approval of the recommendations in the Evaluation and Optimization reports and as required by EPA in consultation with DEQ, SDs shall prepare remedial design plans in draft for EPA review in consultation with DEQ. Upon approval of the final remedial design plan and accompanying remedial action plan, the SDs shall implement the Work required by these plans.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

### 2.2.2.2 Localized Groundwater Study

Following construction of the BRW ponds, the UAO Respondents monitored both local wells and the Silver Bow Creek reach adjacent to the BRW. The UAO Respondents monitored water levels, contaminant concentrations and other parameters to evaluate the capture effectiveness on the upgradient edge of the BRW ponds and Hydraulic Control Channel (HCC). The ongoing remedial elements for the BRW groundwater and surface water monitoring are:

1. *Monitoring Implementation* –The investigation and monitoring upgradient of the BRW/HCC capture system was maintained until 2018, when the continued groundwater elevation monitoring activities were made part of the BRW Phase I QAPP (AR 2018). The BRW Phase I QAPP retained specific components of the former monitoring program while expanding monitoring to address data gaps within the BRW Site to support remedial design. SDs shall continue monitoring through completion of the BRW Phase I Investigation and the subsequent BRW Phase II Investigation QAPP (AR 2019).
2. *Complete Report* – Monitoring shall continue by the SDs as a part of the Butte Reduction Works (BRW) Smelter Area groundwater pre-design investigation described in Attachment C to the BPSOU SOW.
3. *Design and Implementation of Recommendations* – Any design and implementation recommendations as the result of this monitoring shall be addressed by the SDs in remedial design as part of the BRW Remedial Element portion of Attachment C to the BPSOU SOW.
4. *Construction Completion Reports (CCRs)* – Implementation of recommendations shall be documented through CCRs as required

## 2.3 Surface Water

In addition to the groundwater remedy, there are multiple surface water remedy components that were required by the 2006 BPSOU Record of Decision, as modified by the 2020 Record of Decision Amendment. The primary surface water remedy component includes capture of certain stormwater, installation of BMPs to reduce impact to Silver Bow Creek below its confluence with Blacktail Creek and Blacktail Creek from contaminated stormwater and suspended sediments and removal of in-stream contaminated sediments. The sediment and adjacent banks removal requirement is expanded to include the removal of all contamination in this area within the floodplain in the 2020 Record of Decision amendment. The 2006 BPSOU Record of Decision also required that the effluent from the BTL facility meet Performance Standards for discharges.

The implementation of the Buffalo Gulch, Grove Gulch, Northside Tailings, Diggings East, Uncaptured Flow Areas, and Insufficiently Reclaimed Sites, and Unreclaimed Sites of Attachment C to the BPSOU SOW will address the remedial requirements for contaminated stormwater and suspended sediments. The



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

implementation of the BRW Smelter Area and Blacktail Creek portions of Attachment C to the BPSOU SOW will accomplish the remedial requirements for the in-stream sediment removal and the floodplain contamination removal (the State will not, however, be responsible for attaining surface and groundwater standards as part of their commitment to conduct BTC Riparian Actions). Continued operation of the BTL shall continue in accordance with approved plans. Attachment A and other parts of this document or other approved plans describe compliance monitoring requirements for in-stream performance standards and the BTL discharge. Appropriate monitoring of the BTL discharge shall be implemented by the SDs.

### **2.3.1 BPSOU Surface Water Management Plan**

The BPSOU Surface Water Management Plan (SWMP), Exhibit 1 to Attachment A to the BPSOU SOW and the SWCDP, present the plan for how to address all surface water monitoring requirements identified in the ROD and describes how the overall remedial action approach meets the surface water remedy specified in the ROD, as it is implemented under this Consent Decree. The SWMP addresses the surface water monitoring detail, implementation of certain requirements described in Attachment A (the SWCDP), sediment monitoring and removal, groundwater monitoring and potential additional groundwater capture, and other elements of the surface water remedy. In any inconsistency between the SWMP and the SWCDP, the SWCDP controls. The ongoing remedial elements for the Surface Water Management Plan are:

1. *Schedule for Completing the Plan* – The Surface Water Management Plan shall be implemented by the SDs.
2. *Updated Plan* – The Surface Water Management Plan may be reviewed from time to time during and after the compliance determination monitoring period. Any revision of the SWMP is subject to EPA approval, in consultation with DEQ, and the procedures for modification set forth in Paragraph 119 of the Consent Decree.

#### **2.3.1.1 Surface Water Monitoring**

The ROD requires an EPA-approved comprehensive, long-term surface water monitoring program that shall include collection of compliance and diagnostic flow and water quality data for normal flow and wet weather conditions, as well as sediment and benthic micro-invertebrate (BMI) monitoring in receiving surface waters, as described in the approved Surface Water Management Plan (SWMP). Sediment monitoring within intermittent stormwater conveyances at the BPSOU is also required as described in the approved SWMP. The remedial elements for site-wide surface water monitoring are:

1. *Surface Water Monitoring QAPP* – In June 2018, the interim BPSOU surface monitoring plan was converted by the SDs to a QAPP format



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

(dated April 24, 2018) and approved by EPA, in consultation with DEQ. The surface water monitoring QAPP specifies the sampling of compliance and performance stations, along with diagnostic sampling occurring to address exceedances or other peculiarities in the surface water data. This QAPP shall be implemented by the SDs, and reviewed and updated annually. The updates shall include both in-stream sediment and BMI monitoring after implementation of BRW and BTC Remedy actions, and protocols for management of construction water, including a temporary variance from compliance with in-stream Performance Standards, consistent with other CFR Basin projects and DEQ regulations, that supports the discharge of less-impacted construction water directly to surface water. The update shall provide that construction water which does not meet the temporary variance standards requires treatment and shall be transferred to the BTL at times when the volume and chemistry of such water will not overwhelm the BTL's capacity and/or prevent it from meeting discharge standards, as approved by EPA during Remedial Design. Construction water meeting temporary variance standards does not require treatment.

2. *Schedule for implementation* – The schedule for implementing the work is provided in the site-wide Surface Water Monitoring QAPP.
3. *Data Summary Reports* – In addition to the reporting requirements contained in Attachment A to the BPSOU SOW, a DSR for the site-wide surface water monitoring program shall be prepared annually by the SDs for submittal to EPA and DEQ. DSR reports shall be submitted by the SDs in draft and are subject to comment by EPA in consultation with DEQ. The final DSR is due from the SDs within 30 days of the receipt of EPA comments made in consultation with DEQ. Final DSRs are subject to comment, review and approval by EPA in consultation with DEQ. Quarterly data reports, without full QA/QC information, shall also be provided by the SDs to EPA and DEQ. However, the SDs shall complete validation of laboratory data throughout the year in an effort ensure that the laboratory data meets the QA/QC requirements.
4. *Surface Water Compliance Comparison and Interpretation Report* – The description and content of the report is included in Section 7.3 of the SWMP and shall be prepared annually by the SDs. Such a report shall be submitted in draft by June 30<sup>th</sup> of each year for EPA comment in consultation with DEQ, and is subject to EPA approval.
5. *Preliminary Diagnostic Evaluation Report* – Presents the results of the evaluation of the cause(s) of an exceedance.
6. *Diagnostic Response Investigation Plan and Report* – If the preliminary report indicates that an investigation is needed, the Diagnostic Response Investigation Plan is developed and the investigation is conducted. A Diagnostic Response Investigation Report presenting the finding of the



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

investigation shall be submitted in draft for EPA comment in consultation with DEQ.

7. *Optimization Report* –As required by EPA in consultation with DEQ, and consistent with the requirements of the CD and Attachment A, a technical optimization and recommendations report shall be prepared by the SDs upon EPA request. The report shall describe proposed changes to surface water conveyances and other remedial elements, SDs recommendations regarding surface water monitoring, and any modified surface water monitoring requirements. The Report is subject to review and approval by EPA in consultation with DEQ. Additional details regarding the surface water remedy optimization report are found in the SWMP.
8. *Design and Implementation of Recommendations* – Following approval of the of the recommendations in the Optimization report and as required by EPA in consultation with DEQ, SDs shall prepare draft remedial design plans for implementation of approved optimizations. Upon EPA approval, in consultation with DEQ, of a final remedial design plan and accompanying remedial action plan, SDs shall implement the Work required by these plans.
9. *Construction Completion Reports (CCRs)* – Implementation of recommendations shall be documented through CCRs as required.
10. *Long-Term Database* – Development of a long-term database for surface water will be described by the SDs in the Site-wide DMP, referenced in the SWMP and implemented by the SDs upon approval.

## **2.4 Operations and Maintenance Plans**

O&M Plans (which may also include monitoring requirements) for all remedial elements and their status are described in the BPSOU SOW, which also contains the requirements and schedules for the completion of all O&M Plans. The text below supplements and describes the requirements for certain O&M plans. All approved interim or final O&M Plans shall continue to be implemented by the SDs.

### **2.4.1 Mine Waste Repository**

A Butte Mine Waste Repository was previously established and may be designated for the disposal of removed waste and contamination associated with BPSOU response actions. When the existing structure is full, it shall be closed by the SDs in compliance with ARARs. A new repository shall be sited next to the existing repository if that capacity is needed. It, too, shall be closed by the SDs using the same methods. In 2013, the current Butte Waste Repository was expanded and a construction completion report on the expansion was submitted and approved by EPA in consultation with DEQ on November 23, 2015. The Mine Waste Repository is being operated and maintained under an approved O&M Manual which is included with the construction completion report for this remedial element.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

#### **2.4.2 GMMIA**

The Granite Mountain Memorial Interpretive Area was reclaimed pursuant to ROD requirements and enhancements were made in keeping with its historical character. These include reclaiming source areas in publicly used areas, restricting access to certain areas of historic mining landscape, installing picnic areas and walking trails, enhancing existing vegetation, and diverting stormwater runoff to the Berkeley Pit. These actions were consistent with the preservation requirements and other standards and the county's historical park plan. The GMMIA is and shall be operated and maintained by the SDs under an approved O&M plan which is included with the construction completion report for the Mine Waste Repository, which was approved on November 23, 2015.

#### **2.4.3 Syndicate Pit**

The Syndicate Pit was reclaimed pursuant to ROD requirements and has been used as a mine training center. Shallow to moderate slopes were reclaimed using soils caps, rock caps, and gravel parking areas. Steep slopes were not reclaimed. The pit base continues to be used as a sediment basin. The Syndicate Pit is and shall be operated and maintained under a Final Superfund Stormwater System Operations and Maintenance Plan. This O&M plan was approved by EPA in consultation with DEQ on August 7, 2018.

#### **2.4.4 BTL, West Camp and BPSOU Subdrain GW Capture and Treatment System**

The ROD requires the continued operation of West Camp capture and pumping structures, the BTL facility, and the HCC for the treatment of captured ground and surface water in accordance with ARARs and any approved or applicable plans. The West Camp facilities, the Butte Treatment Lagoons facility, and the HCC shall continue to be operated and maintained in as effective and efficient manner as possible by the SDs such that Performance Standards are obtained under a variety of conditions for end of pipe discharges. Monitoring and data reporting under existing O&M plans are ongoing.

The Draft Final Butte Treatment Lagoon Groundwater Treatment System Routine Operations, Maintenance, and Monitoring Plan was submitted by UAO Respondents to EPA and DEQ for review and comment on August 30, 2018, and EPA and DEQ submitted review comments on the document in December 2018. The SDs shall submit a Draft Final Butte Treatment Lagoon Groundwater Treatment System Routine Operations, Maintenance, and Monitoring Plan for review and possible approval by EPA in consultation with DEQ, and shall implement the plan upon EPA approval in consultation with DEQ.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

#### **2.4.5 Stormwater Structures O&M Plan**

The Superfund Stormwater System Operations and Maintenance Plan was approved by EPA in consultation with DEQ on August 7, 2018 and shall be implemented by the SDs. Since 2009, the UAO Respondents have also prepared a variety of preliminary evaluations that looked at how improvements, maintenance activities or other actions could enhance the overall performance of the existing stormwater infrastructure and improve water quality within the BPSOU. The intent of these evaluations is to improve water quality that discharges from the existing stormwater infrastructure and other stormwater sources into Silver Bow Creek below its confluence with Blacktail Creek. The SDs continue to evaluate the effectiveness of the existing stormwater BMPs and determine if additional actions or operational improvements on those BMPs are necessary.

The SDs shall submit these evaluations to EPA and DEQ on request, and the SDs shall implement the actions recommended by the evaluations as directed by EPA in consultation with DEQ.

#### **2.4.6 BSBC Street Maintenance and Snow Management Plan**

The UAO Respondents Responsible Parties developed a draft comprehensive street maintenance and snow management plan for the BPSOU that will cover issues such as snow removal and storage, heavy metal sampling of sand before it is used on the streets, street cleaning, and the use of water to prevent dust problems from potentially contaminated dirt on city streets. The UAO Respondents have submitted the Draft Street and Snow Management Plan on June 11, 2018, and the EPA and DEQ provided comments on the plan on August 18, 2018. The SDs shall submit a revised plan within 90 days of the Effective Date. The SDs shall implement the plan upon EPA approval, in consultation with DEQ.

#### **2.4.7 RARUS Properties O&M Plan**

The UAO Respondents submitted a draft O&M Plan to the agencies on September 26, 2019 for the railroad properties owned by RARUS Railroad Company. EPA and DEQ will provide comments, and the plan shall be resubmitted by the SDs within 30 days of the receipt of comments for EPA review and approval in consultation with DEQ.

### **2.5 Document Submittal and Review Process**

The SDs will be required to submit all documents described herein to the EPA and DEQ for review. These documents will also be provided to the public as provided in the BPSOU SOW. The EPA in consultation with DEQ will review the document and provide the SDs with comment or approval of the document(s) in accordance with BPSOU SOW requirements, Section 6. If the EPA in consultation with DEQ provides comments, the SD will revise the document based on EPA comments and resubmit the document as a draft final. After receipt of the draft final document(s), the EPA will review the document and determine if comments have been addressed



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

or provide the SDs with additional comment. This EPA and DEQ review process will continue until all comments have been addressed and or resolved. When comments have been resolved, the EPA in consultation with DEQ will provide the SDs with approval of the document(s).

## 2.6 Project Deliverables and Schedule

All deliverables and tasks required under this Scope of Work must be submitted or completed by the deadlines or within the time durations listed in the RD and RA Schedules for the Ongoing Remedial Elements set forth below in Table 2-1. SDs may submit proposed revised RD Schedules or RA Schedules for EPA approval. Upon EPA's approval, the revised RD and/or RA Schedules supersede the RD and RA Schedules set forth below, and any previously-approved RD and/or RA Schedules.

**Table 2-1 RD and RA Schedules for the Ongoing Remedial Elements**

Reference Section	Document or Activity	Submittal or Completion Date
<b>2.1 Solid Media</b>		
<b>2.1.2 Non-Residential Solid Media and the Butte Reclamation Evaluation System (BRES)</b>		
<b>2.1.2.1 Non-Residential Solid Media</b>		
	Plan	Within 90 days of Effective Date
	QAPP	As required
	Schedule for Implementation	As required
	Data Summary Report	As required
	Corrective Action Plans	As required
	Construction Completion Report	As required
	Update Long-term database	As required
<b>2.1.2.2 BRES Program</b>		
	Plan	Within 90 days of Effective Date
	QAPP	As required
	Schedule for Implementation	As required
	Data Summary Report	As required
	Corrective Action Plans	As required
	Construction Completion Report	As required
	Update Long-term database	As required
<b>2.2 Groundwater</b>		
<b>2.2.1 Groundwater Management Plan</b>		
	Plan	Within 90 days of Effective Date
<b>2.2.1.1 Site-Wide Groundwater Monitoring</b>		
	Site-wide Groundwater Monitoring QAPP	Annually in November
	Schedule for Implementation	Annually in November
	Data Summary Report	Annually in May
	Recommendations Report	Annually in May
	Compliance Comparison Report	Annually in June
	Update Long-term database	Ongoing



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

<b>2.2.1.2 Controlled Groundwater Area Monitoring</b>		
	Controlled Groundwater Area QAPP	Annually in November
	Schedule for Implementation	Annually in November
	Data Summary Report	Annually in May
	Corrective Action Plans	As required
	Construction Completion Report	As required
	Update Long-term database	Ongoing

Reference Section	Document or Activity	Submittal or Completion Date
<b>2.2.1.3 Butte Treatment Lagoons, West Camp, and BPSOU Subdrain Groundwater Capture System Operations, Maintenance, and Monitoring</b>		
	Plan	As needed, if revised and submitted then use date of plan approval.
	QAPP	Annually in November
	Schedule for Implementation	Annually in November
	Data Summary Report	Quarterly, and end of year summary in May
	Compliance Comparison Report	Annually in June
	Optimization Report	As required
	Update Long-term database	Ongoing
<b>2.2.2 BPSOU Subdrain Groundwater Management Report</b>		
<b>2.2.2.1 Evaluation of the BPSOU Capture and Conveyance System Performance</b>		
	Scoping Meeting	90 days after KRECCR
	Work Plan and QAPP	90 days after scoping meeting
	Schedule for Implementation	90 days after scoping meeting
	Data Summary Report	90 days after field investigation
	Evaluation Report	120 days after field investigation
	Optimization Report	120 days after evaluation report
	Design and Implementation of Recommendations	Next field season
<b>2.2.2.2 Localized Groundwater Study</b>		
	Monitoring and Implementation	Ongoing
	Complete Report	90 days after field investigation
	Design and Implementation of Recommendations	Following field season
	Construction Completion Report	90 days after construction
<b>2.3 Surface Water</b>		
<b>2.3.1.1 Surface Water Monitoring</b>		
	Surface Water Monitoring QAPP	Annually in November
	Schedule for Implementation	Annually in November
	Data Summary Report	Annually in May
	Surface Water Compliance Comparison and Interpretation Report	Annually in June



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

	Preliminary Diagnostic Evaluation Report	Within 60 days of request or notification
	Diagnostic Response Investigation Plan and Report	As required
	Optimization Report	As required
	Design and Implementation of Recommendations	Start 30 days after approval of optimization report
	Construction Completion Report	90 days after construction
	Update Long-term database	Ongoing
<b>2.4 Operations and Maintenance Plans</b>		
<b>2.4.1 Mine Waste Repository</b>	Plan	Update as required
<b>Reference Section</b>	<b>Document or Activity</b>	<b>Submittal or Completion Date</b>
<b>2.4 Operations and Maintenance Plans</b>		
<b>2.4.2 GMMIA</b>	Plan	Update as required
<b>2.4.3 Syndicate Pit</b>	Plan	Update as required
<b>2.4.4 BTL, West Camp and BPSOU Subdrain GW Capture and Treatment System</b>	Plan	Update as required
<b>2.4.5 Stormwater Structures O&amp;M Plan</b>	Plan	Update as required
<b>2.4.6 BSBC Street Maintenance and Snow Management Plan</b>	Plan	Within 90 days of Effective Date



**FURTHER REMEDIAL ELEMENTS  
SCOPE OF WORK**

**for the  
BUTTE PRIORITY SOILS OPERABLE UNIT  
of the  
SILVER BOW CREEK / BUTTE AREA SUPERFUND  
SITE  
Butte-Silver Bow County, Montana**

**ATTACHMENT C TO APPENDIX D  
TO THE CONSENT DECREE**



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## TABLE OF CONTENTS

<b>1.0</b>	<b>DIGGINGS EAST STORMWATER BASIN AREA .....</b>	<b>1</b>
1.1	Remedial Construction Activities.....	1
1.1.1	Stormwater Retention/Detention, Conveyance, and Treatment.....	1
1.1.2	Tailings, Waste, and Contaminated Soils Excavation, Removal, and Disposal.....	3
1.1.3	Regrading, Revegetation and Capping.....	4
1.2	Institutional Control Considerations.....	5
1.3	Potential Impacts to Existing Remedial Components .....	5
1.4	Additional Project Requirements and Information to be Addressed in Remedial Design.....	5
<b>2.0</b>	<b>BUFFALO GULCH STORMWATER BASIN(S).....</b>	<b>7</b>
2.1	Remedial Construction Activities.....	7
2.1.1	Stormwater Retention/Detention, Conveyance, and Treatment.....	7
2.1.2	Tailings, Waste, and Contaminated Soils Excavation, Removal, and Disposal.....	9
2.1.3	Regrading, Revegetation and Capping.....	10
2.2	Institutional Control Considerations.....	11
2.3	Potential Impacts to Existing Remedial Components .....	11
2.4	Additional Project Requirements and Information to be Addressed in Remedial Design.....	12
<b>3.0</b>	<b>NORTHSIDE TAILINGS / EAST BUFFALO GULCH AREA.....</b>	<b>14</b>
3.1	Remedial Construction Activities.....	14
3.1.1	Stormwater Basin or Sedimentation Bay, Vegetated Swale .....	14
3.1.2	Tailings, Waste, and Contaminated Soils Excavation, Removal, and Disposal.....	16
3.1.3	Regrading, Revegetation and Capping.....	17
3.2	Institutional Control Considerations.....	18
3.3	Potential Impacts to Existing Remedial Components .....	18
3.4	Additional Project Requirements and Information to be Addressed in Remedial Design.....	18
<b>4.0</b>	<b>GROVE GULCH SEDIMENTATION BAY .....</b>	<b>20</b>
4.1	Remedial Construction Activities.....	20
4.1.1	Stormwater Sedimentation Bay and Vegetated Swale.....	20
4.1.2	Tailings, Waste and Contaminated Soils Excavation, Removal, and Disposal.....	21
4.1.3	Regrading, Revegetation and Capping.....	22
4.2	Institutional Control Considerations.....	22
4.3	Additional Project Requirements and Information to be Addressed in Remedial Design.....	22
<b>5.0</b>	<b>BLACKTAIL CREEK REMEDIATION AND CONTAMINATED GROUNDWATER HYDRAULIC CONTROL .....</b>	<b>24</b>
5.1	Remedial Construction Activities.....	25



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**TABLE OF CONTENTS (continued)**

5.1.1	Remove All Tailings, Waste, Contaminated Sediments and Soils (DEQ Responsibilities).....	25
5.1.2	Control Contaminated Groundwater (SDs Responsibilities).....	26
5.2	Reconstruct Blacktail Creek and Silver Bow Creek Below the Confluence with Blacktail Creek (DEQ Responsibilities).....	28
5.3	Institutional Control Considerations.....	29
5.4	Additional Project Requirements and Information to be Addressed in Remedial Design.....	29
<b>6.0</b>	<b>BUTTE REDUCTION WORKS SMELTER AREA MINE WASTE REMEDIATION AND CONTAMINATED GROUNDWATER HYDRAULIC CONTROL .....</b>	<b>32</b>
6.1	Remedial Construction Activities.....	33
6.1.1	Remove Tailings, Waste, Contaminated Soils, and Slag at the BRW Smelter Removal Areas.....	33
6.1.2	Hydraulically Control and Treat Contaminated Groundwater within the BRW Smelter Area .....	34
6.1.3	Realign Silver Bow Creek Below the Confluence with Blacktail Creek and Construct 100-Year Floodplain .....	36
6.1.4	Regrade and Construct Cap(s) .....	36
6.2	Institutional Control Considerations.....	37
6.3	Further Information Needed .....	37
6.4	Additional Project Requirements and Information to be Addressed in Remedial Design.....	38
<b>7.0</b>	<b>INSUFFICIENTLY RECLAIMED SOURCE AREAS.....</b>	<b>40</b>
7.1	Site Evaluations .....	40
7.2	Remedial Action Work Plans .....	40
7.3	Site Reclamation.....	41
<b>8.0</b>	<b>UNRECLAIMED SOLID MEDIA SITES .....</b>	<b>43</b>
8.1	Site Evaluations .....	43
8.2	Remedial Action Work Plans .....	44
8.3	Site Reclamation.....	44
<b>9.0</b>	<b>UNCONTROLLED SURFACE FLOW AREAS BMPS .....</b>	<b>47</b>
9.1	Site Evaluations .....	47
9.2	Remedial Action Work Plans .....	48
9.3	Remedial Action.....	48
<b>10.0</b>	<b>END LAND USE ADDITIONS - ADDENDUM 1 .....</b>	<b>49</b>
<b>11.0</b>	<b>REFERENCES .....</b>	<b>50</b>



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**LIST OF FIGURES, APPENDIX, AND ADDENDUM**

Figure DE-1	Diggings East
Figure BG-1	Buffalo Gulch
Figure NST-1	Northside Tailings/East Buffalo Gulch
Figure GG-1	Grove Gulch
Figure BTC-1	Blacktail Creek
Figure BRW-1	Butte Reduction Works
Figure IR-1	Insufficiently Reclaimed Areas
Figure UR-1	Unreclaimed Solid Media Sites
Figure USFA-1	Uncontrolled Surface Flow Areas
Appendix 1	Tables 1, 2, and 3
Addendum 1	End Land Use Additions



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **1.0 DIGGINGS EAST STORMWATER BASIN AREA**

A lined stormwater retention/detention basin shall be constructed after the removal of contaminated waste materials within the Diggings East area to improve stormwater quality for the sub-drainage area upstream of Casey Street in Silver Bow Creek above the confluence with Blacktail Creek (SBC-Above the Confluence) by the SDs. The required remedial construction activities are:

1. *Stormwater Retention/Detention, Conveyance, and Treatment* – Construction of a lined stormwater retention/detention basin with volume sufficient to retain/detain and treat, through passive settling of sediments, the 10-year 24-hour Type I storm of the SBC-Above the Confluence sub-drainage area upstream of Casey Street in SBC-Above the Confluence. The remedial design process shall determine the managed retention volume and detention time period for optimal treatment, while also considering end land use and vegetation survival. The basin will generally be designed and operated consistent with standard published stormwater BMP guidance available at the time of remedial design.
2. *Tailings, Waste, and Contaminated Soils Excavation, Removal, and Disposal* – Removal of all tailings, waste and contaminated soils that exceed the Waste Identification Criteria in Table 1 of Appendix 1, and as shown on Figure DE-1, which are unsaturated by groundwater to the maximum observed groundwater elevation surface as recorded over the most recent 3-year monitoring period.
3. *Regrading, Revegetation and Capping* – Regrading, vegetating, and constructing a cover system, in accordance with Table 3, of Appendix 1 and as shown on Figure DE-1.

### **1.1 Remedial Construction Activities**

#### **1.1.1 Stormwater Retention/Detention, Conveyance, and Treatment**

Stormwater from the SBC-Above the Confluence sub-drainage shall be directed to a retention/detention basin located at the Diggings East. The combined volume of the forebay and basin shall be a minimum of 32 acre-feet in volume, which is equivalent to the runoff volume from a 10-year 24-hour SCS Type I storm event. The basin shall include a maintainable forebay for collection of coarse sediment that will facilitate periodic clean out in the basin. Forebay cleanout frequency shall be determined by the SDs with the schedule set forth in the operation and maintenance (O&M) plan. Additional sediment storage volume beyond the stormwater capacity shall be included in the main stormwater retention/detention basin. This volume is intended to maintain system performance, minimize O&M cleanout frequency, and prevent structural or vegetation disturbances. No structural or vegetation disturbances shall occur in the primary basin during the



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

compliance standard determination monitoring period. The sediment storage volume in the main basin shall be sized to limit the cleanout frequency to no more than once every 20 years; modeling of the 20-year sediment accumulation volume shall be provided with the final design and subject to EPA approval, in consultation with DEQ. Cleanout of the main basin may be initiated more frequently if conditions require, with attendant provisions included in the O&M plan to maintain the integrity of the liner and re-establishment of the basin vegetation.

The basin shall be engineered and managed according to site ARARs, and the applicable requirements of Butte-Silver Bow's Municipal Stormwater Engineering Standards (BSBC 2011). If there are conflicting requirements, unless specifically stated otherwise herein, the SDs shall consult with EPA and DEQ, and EPA, in consultation with DEQ, will determine the appropriate requirement to follow, based on requirements included in the approved remedial design work plan.

The basin shall be designed and constructed in a fashion that would allow it to be operated as a detention or retention basin to reach optimal treatment efficiency, to be determined during remedial design. The basin also must be sized to adequately pass the diverted influent flow from the SBC-Above the Confluence channel as described above. Any diversion structure constructed within the existing SBC-Above the Confluence channel shall be sized according to Butte Silver Bow Municipal stormwater requirements.

The stormwater basin liner shall be designed to meet the following leakage performance specification:  $1 \times 10^{-7}$  centimeters per second (cm/s). A plan to monitor leakage through the liner shall also be developed during final design and approved by EPA, in consultation with DEQ.

The objective of the basin leak detection monitoring system is to assess leakage from the basin to protect the BPSOU sub-drain, groundwater and Blacktail Creek from infiltration of stormwater through adjacent tailings, wastes or contaminated soils and additional contaminant loading to groundwater. Monitoring and leak detection data shall be collected utilizing stormwater water balance, existing wells, and newly installed groundwater monitoring wells that are located downgradient, cross-gradient, and upgradient of the basin. Other leak detection technology/methods as approved by EPA in consultation with DEQ may be used as an alternative to the storm water balance. SDs may additionally employ piezometers. To the extent feasible, the detection system shall be capable of detecting leakage at a rate of  $1 \times 10^{-6}$  cm/s. The exact number, type, and location of



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

monitoring wells, proposed analytes, and monitoring frequency shall be submitted to EPA for approval, in consultation with DEQ, as a component of the final design plan.

If leakage is detected as described above, the SDs shall generate a report describing the leakage and any effects, and shall submit this report to EPA and DEQ. The report shall include recommended actions for correcting the leak if it adversely impacts surface water, the groundwater capture system (BPSOU subdrain), groundwater mounding concerns, neighbors and the surrounding area, or the integrity, operation and/or capacity of the stormwater basin. Corrective measures directed by EPA, in consultation with DEQ, in response to this report shall be implemented by the SDs.

**1.1.2 Tailings, Waste, and Contaminated Soils Excavation, Removal, and Disposal**

The exact location of the basin shall be determined in design, and approved by EPA, in consultation with DEQ. The footprint location shall consider the future land use for the Diggings East area.

All materials within the project area, as shown on Figure DE-1, that exceed the Waste Identification Criteria in Table 1 of Appendix 1 will be removed and disposed of as described below. The depth of excavation shall extend to the maximum observed groundwater elevation as recorded over the most recent 3-year monitoring period. The horizontal and vertical delineation of tailings, waste and contaminated soils, and other waste, along with an evaluation of critical infrastructure will be performed prior to remedial design. Critical infrastructure will be protected during removal construction actions, and removal of waste around those features will not be required, as determined by EPA, in consultation with DEQ. Pre-design investigation sampling shall be used to refine the location of the removal area based on Appendix 1 criteria.

Unless suitable for use as backfill (under Appendix 1, Table 2), removed tailings, wastes and contaminated soils that exceed the Waste Identification Criteria in Table 1 of Appendix 1 shall be segregated and disposed of at a repository approved by EPA in consultation with DEQ, which is not located in the SBC-Above the Confluence or Blacktail Creek areas. Inert solid waste and construction debris may remain on-site for use as backfill that meets Table 2 of Appendix 1 criteria. All other municipal wastes, if encountered at the Diggings East area, shall be segregated and disposed of at an appropriate permitted facility by the SDs.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

### **1.1.3 Regrading, Revegetation and Capping**

Removed tailings, waste, and contaminated soils shall be replaced to existing or appropriate elevations with material suitable for establishing appropriate vegetation. Imported backfill and Engineered Cap materials shall meet the applicable Backfill and Cover System Material Suitability Criteria in Table 2 and Table 3 of Appendix 1. If onsite materials do not exceed the Waste Identification Criteria in Table 1 of Appendix 1, the material may be used onsite as general fill provided it meets all other requirements for general fill in Table 2 of Appendix 1 (e.g., texture, pH). Blending of waste material and clean material will not be allowed. All waste exceeding the Waste Identification Criteria in Table 1 of Appendix 1 will be disposed of off-site.

Regrading shall be conducted on the areas outside of the basin to produce a landscape suitable for the determined future land use of the Diggings East area, subject to consistency with the BPSOU remedial action objectives. The future land use shall be coordinated with Butte-Silver Bow County, and will be evaluated by EPA, in consultation with DEQ, by looking at information such as local ordinances and zoning, patterns of development in the area, and information from local planning officials and information provided by the public.

For landscaping purposes, a maximum additional 10 percent of the imported cap material volume over the fill required by the remedial design shall be provided to accommodate the future land use, if needed. The additional soil for landscaping purposes shall meet the General Fill Criteria B requirements in Table 2 of Appendix 1. A cover system, where necessary, shall be constructed in areas as shown on Figure DE-1. The cover system shall be constructed in accordance with the criteria set forth in Appendix 1.

Modification of this design description may be implemented in coordination and support of proposed features (e.g., maintenance access road, parking lot, trail, etc.) consistent with listed design elements, and subject to EPA approval, in consultation with DEQ. These modifications may require placement of structural sub-base course. Specific requirements and specific design of cap and cover sections shall be developed during the design phase of the project, subject to EPA approval in consultation with DEQ. Should any additional measures be required to maintain the effectiveness of the BPSOU groundwater capture system as a result of this action, these shall be developed in the design phase of the project, subject to EPA approval in consultation with DEQ, as described below.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

### **1.2 Institutional Control Considerations**

Through the planning and design process, certain institutional controls shall be identified and described in the remedial design plan. The implementation of any institutional control for this area shall be a cooperative effort among local government, state government, SDs, and other project stakeholders, and shall be the responsibility of the SDs. Potential institutional controls may include motorized and non-motorized travel restrictions, sensitive area exclusions, and future site development restrictions. Fencing or other access restrictions may also be identified.

Any existing institutional controls (including the CGWA) shall remain in effect, including throughout construction.

### **1.3 Potential Impacts to Existing Remedial Components**

Construction of the stormwater basin is not expected to adversely impact performance of the existing BPSOU groundwater remedy within the SBC-Above the Confluence corridor. An evaluation of the remedial performance of the subdrain capture and treatment system shall be conducted by the SDs following the 4<sup>th</sup> and final cycle BMP implementation and prior to KRECCR approval. The evaluation will determine if any additional upgrades to the existing system(s) are needed, as a result of this action. Any upgrades proposed by the SDs are subject to approval of EPA, in consultation with DEQ, and shall be implemented upon such approval. Further discussion of the evaluation of the remedial performance of the subdrain capture and treatment system is set forth in Attachment B.1, Section 2.2.2.1 of the BPSOU Statement of Work (SOW).

### **1.4 Additional Project Requirements and Information to be Addressed in Remedial Design**

1. **Engineering Design:** Detailed design of the stormwater basin including the liner system(s), leak monitoring plan, surface grading, and detailed design of cover systems and caps in accordance with this section.
2. **Excavation and Disposal Analysis:** The horizontal and vertical delineation of tailings, waste and contaminated soils, and other waste will be performed prior to remedial design. Pre-design investigation sampling shall be used to refine the location and extent of the removal area as shown on Figure DE-1 and based on Appendix 1 criteria. The expected disposal quantities of tailings, waste, and contaminated soils shall be further investigated to select an appropriate repository location(s). The excavation and disposal plans shall be developed during the project design phase subject to EPA approval, in consultation with DEQ.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

3. **Municipal Waste Characterization and Disposal Plan:** Screening criteria shall be developed to accurately characterize and quantify municipal waste intended for disposal at the Butte-Silver Bow municipal landfill. Contingency excavation and disposal plans shall be developed during the project design phase subject to EPA approval, in consultation with DEQ.
4. **Backfill Material Characterization and Reuse Plan:** A sampling and analysis plan shall be developed to further delineate existing site soils that may be characterized and reused as suitable backfill material in accordance with Table 2 of Appendix 1, so long as such site materials do not exceed the Waste Identification Criteria in Table 1 of Appendix 1. If onsite materials do not exceed the Waste Identification Criteria in Table 1 of Appendix 1, the material may be used onsite as general fill provided it meets all other requirements for general fill in Table 2 of Appendix 1 (e.g., texture, pH). Blending of waste material and clean material will not be allowed. All material exceeding the Waste Identification Criteria in Table 1 of Appendix 1 will be disposed of off-site.
5. **Other Waste or Impacted Materials:** The presence and type of additional waste impacted materials within the perimeter of the project site is relatively unknown due to the uncontrolled nature of historic dumping activities. Additional waste or impacted material that may be encountered includes hydrocarbons, solvents, detergents, or other organic materials. Contingency excavation and disposal plans shall be developed during the project design phase subject to EPA approval, in consultation with DEQ.
6. **Geotechnical Conditions:** EPA, in consultation with DEQ, may require geotechnical investigation to adequately characterize subsurface conditions in areas of the basin, diversion structures, discharge structures or any other structural feature, or to optimize the horizontal extents of excavation and minimize off-site disposal of materials. SDs may also propose such investigations in design documents.
7. **Other:** EPA, in consultation with DEQ, may identify additional design data gaps during the design phase and require the SDs to address during design. SDs may also identify such data gaps.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **2.0 BUFFALO GULCH STORMWATER BASIN(S)**

A lined stormwater retention/detention basin(s) shall be constructed by the SDs to address stormwater for the Buffalo Gulch sub-drainage. The required remedial construction activities are:

1. *Stormwater Retention/Detention, Conveyance, and Treatment* – Construction of a lined stormwater retention/detention basin with a volume sufficient to retain/detain and treat, through passive settling of sediments, the 10-year 24-hour Type I storm of the Buffalo Gulch drainage area. The remedial design process shall determine the managed retention volume and detention time period for optimal treatment, while also considering end land use and vegetation survival. The basin will generally be designed and operated consistent with standard published stormwater BMP guidance available at the time of remedial design.
2. *Tailings, Waste, and Contaminated Soils Excavation, Removal, and Disposal* – Removal of all tailings, waste and contaminated soils that exceed the Waste Identification Criteria in Table 1 of Appendix 1, which are unsaturated by groundwater, beneath the stormwater basin footprint to the maximum observed groundwater elevation surface as recorded over the most recent 3-year monitoring period. An Engineered Cap is required if tailings, waste, and contaminated soils are found outside of the basin footprint (see Figure BG-1).
3. *Regrading, Revegetation and Capping* – Regrading, vegetating, and constructing an Engineered Cap, in accordance with Table 3, of Appendix 1 and as shown on Figure BG-1.

## **2.1 Remedial Construction Activities**

### **2.1.1 Stormwater Retention/Detention, Conveyance, and Treatment**

Stormwater from the Buffalo Gulch sub-drainage (reporting through sampling point BG-01) shall be directed to a retention/detention basin. The exact location of the basin shall be determined in design, and approved by EPA, in consultation with DEQ. The preferred location is located entirely south of the railroad tracks on the former wetland demonstration area (WL12), however the basin may be split between the north and south of the railroad tracks, or water could be moved to another location, in order to achieve the necessary volume (Figure BG-1). If approved by EPA, in consultation with DEQ, the area north of the railroad tracks could include the deeded property of AR (commonly referred to as the McDonough property), or the property currently owned by the Lisac's. If the Lisac property is used, the SDs shall not be required to purchase or own the Lisac



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

property unless an agreement is reached which would avoid incurring liability by the SDs for the hydrocarbon contamination at that property.

The combined volume of the forebay and basin shall be a minimum of 20 acre-feet in volume, which is equivalent to the runoff volume from a 10-year, 24-hour SCS Type I storm event. The basin shall include a maintainable forebay for collection of coarse sediment that will facilitate periodic clean out in the basin. Forebay cleanout frequency shall be determined by the SDs with the schedule set forth in the O&M plan. Additional sediment storage volume beyond the stormwater capacity shall be included in the main stormwater retention/detention basin. This volume is intended to maintain system performance, minimize O&M cleanout frequency, and prevent structural or vegetation disturbances. No structural or vegetation disturbances shall occur during the compliance standard determination monitoring period. The sediment storage volume in the main basin shall be sized to limit the cleanout frequency to no more than once every 20 years; modeling of the 20-year sediment accumulation volume shall be provided with the final design and subject to EPA approval, in consultation with DEQ. Cleanout of the main basin may be initiated more frequently if conditions require, with attendant provisions included in the O&M plan to maintain the integrity of the liner and re-establishment of the basin vegetation.

The basin shall be engineered and managed according to site ARARs, and the applicable requirements of Butte-Silver Bow's Municipal Stormwater Engineering Standards (BSBC 2011). If there are conflicting requirements, unless specifically stated otherwise herein, the SDs shall consult with EPA and DEQ, and EPA, in consultation with DEQ, will determine the appropriate requirement to follow, based on requirements included in the approved remedial design work plan. The basin shall be designed and constructed in a fashion that would allow it to be operated as a detention or retention basin to reach optimal treatment efficiency, to be determined during remedial design. The basin shall also be sized to adequately pass the diverted influent from the Buffalo Gulch sub-drainage area as described above. Any diversion structure shall be sized according to Butte Silver Bow Municipal stormwater requirements.

SDs shall perform a technical evaluation of the basin liner and infiltration that accounts for protection of the groundwater capture system (BPSOU subdrain), groundwater mounding concerns, impacts to neighbors and the surrounding area, and impacts on the integrity and/or capacity of the



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

stormwater basin. The stormwater basin shall be lined if it is determined that infiltration could adversely affect surface water quality, groundwater capture, or neighboring properties. The evaluation will be approved by EPA in consultation with DEQ. A plan to monitor effects of leakage or infiltration shall also be developed during final design and approved by EPA, in consultation with DEQ.

The objective of the basin leak detection monitoring system is to assess leakage from the basin to Silver Bow Creek below the confluence with Blacktail Creek from infiltration of stormwater through adjacent tailings, wastes or contaminated soils and additional contaminant loading to groundwater. Monitoring and leak detection data shall be collected utilizing stormwater water balance, existing wells, and newly installed groundwater monitoring wells. Other leak detection technology/methods as approved by EPA, in consultation with DEQ may be used as an alternative to the stormwater balance. As necessary, groundwater monitoring wells shall be located downgradient, cross-gradient, and upgradient of the basin. SDs may additionally employ piezometers. The detection system shall be capable of detecting leakage at an appropriate rate to fully evaluate impacts of leakage or infiltration. The exact number, type, and location of monitoring wells, proposed analytes, and monitoring frequency shall be submitted to EPA for approval, in consultation with DEQ, as a component of the final design plan.

If infiltration following basin construction is determined to have adverse effects as described above, the SDs shall generate a report describing the effects, and shall submit this report to EPA and DEQ. The report shall include recommended actions for corrections. Corrective measures directed by EPA, in consultation with DEQ, in response to this report shall be implemented by the SDs.

#### **2.1.2 Tailings, Waste, and Contaminated Soils Excavation, Removal, and Disposal**

The exact location of the basin shall be determined in design, and approved by EPA, in consultation with DEQ. All materials below the basin(s) that exceed the Waste Identification Criteria in Table 1 of Appendix 1, will be removed and disposed of as described below. The depth of excavation below the basin shall extend to the maximum observed groundwater elevation as recorded over the most recent 3-year monitoring period. The horizontal extent of the excavation for the basin is limited to the crest of the basin (at the liner anchor trench) with additional accommodation of excavation layback as dictated by the angle of repose of the tailings, wastes



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

and contaminated soils being removed. Critical infrastructure will be protected during removal construction actions, and removal of waste around those features will not be required, as determined by EPA, in consultation with DEQ.

Unless suitable for use as backfill (under Appendix 1, Table 2), removed tailings, wastes and contaminated soils that exceed the Waste Identification Criteria in Table 1 of Appendix 1 shall be segregated and disposed of at a repository approved by EPA in consultation with DEQ, which is not located in the SBC-Above the Confluence or Blacktail Creek areas. Inert solid waste and construction debris may remain on-site for use as backfill that meets Table 2 of Appendix 1 criteria. All other municipal wastes, if encountered at the Buffalo Gulch area, shall be segregated and disposed of at an appropriate permitted facility by the SDs.

### **2.1.3 Regrading, Revegetation and Capping**

Removed tailings, waste, and contaminated soils outside of the basin(s) footprint, as described above, shall be replaced to existing or appropriate elevations with material suitable for establishing appropriate vegetation. Tailings, waste, and contaminated soils outside the footprint of the stormwater basin (regraded to facilitate installation of the engineered cap system) may be left in place if appropriately capped as approved in design and as set forth below. Imported backfill and Engineered Cap materials shall meet the applicable Backfill and Engineered Caps Material Suitability Criteria in Table 2 and Table 3 of Appendix 1. If onsite materials do not exceed the Waste Identification Criteria in Table 1 of Appendix 1, the material may be used onsite as general fill provided it meets all other requirements for general fill of Table 2 of Appendix 1 (e.g., texture, pH). Blending of waste material and clean material will not be allowed. All waste exceeding the Waste Identification Criteria in Table 1 of Appendix 1 will be disposed of off-site.

Regrading shall be conducted on the areas outside of the basin to produce a landscape suitable for the determined future land use of the Buffalo Gulch Area, subject to consistency with the BPSOU remedial action objectives. The future land use shall be coordinated with Butte-Silver Bow County, and will be evaluated by EPA in consultation with DEQ, by looking at information such as local ordinances and zoning, patterns of development in the area, and information from local planning officials and information provided by the public.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

For landscaping purposes, a maximum additional 10 percent of the imported cap material volume over the fill required by the remedial design shall be provided to accommodate the future land use, if needed. The additional soil for landscaping purposes shall meet the General Fill Criteria B requirements in Table 2 of Appendix 1.

Modification of this design description may be implemented in coordination and support of proposed features (e.g., maintenance access road, parking lot, trail, etc.) consistent with listed design elements, and subject to EPA approval, in consultation with DEQ. These modifications may require placement of structural sub-base course. Specific requirements and specific design of cap sections shall be developed during the design phase of the project, subject to EPA approval in consultation with DEQ. Should any additional measures be required to maintain the effectiveness of the BPSOU groundwater capture system, as a result of this action, these shall be developed in the design phase of the project, subject to EPA approval, in consultation with DEQ, as described below.

## **2.2 Institutional Control Considerations**

Through the planning and design process, certain institutional controls shall be identified and described in the remedial design plan. The implementation of any institutional control for this area shall be a cooperative effort among local government, state government, SDs, and other project stakeholders, and shall be the responsibility of the SDs. Potential institutional controls may include motorized and non-motorized travel restrictions, sensitive area closures, and future site development restrictions. Fencing or other access restrictions may also be identified.

Any existing institutional controls (including the CGWA) shall remain in effect, including throughout construction.

## **2.3 Potential Impacts to Existing Remedial Components**

Construction of the stormwater basin is not expected to adversely impact performance of the existing BPSOU groundwater remedy within the SBC-Above the Confluence corridor. As conceptualized, construction of the Buffalo Gulch stormwater features and adjacent capping is expected to maintain or reduce site infiltration rates through tailings, waste, and contaminated soils, and is not expected to adversely affect compliance with BPSOU Record of Decision RAOs. Leakage from the stormwater basin through tailings, waste, and contaminated soils beneath the basin shall be addressed through repair or maintenance of the basin and liner system. Regardless, an evaluation of the remedial performance of the subdrain capture and treatment system shall be conducted by the SDs following the 4<sup>th</sup> and



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

final cycle BMP implementation and completed prior to KRECCR approval. The evaluation will determine if any additional upgrades to the existing system(s) are needed. Any upgrades proposed by the SDs are subject to approval of EPA, in consultation with DEQ, and shall be implemented upon such approval. Further discussion of the evaluation of the remedial performance of the subdrain capture and treatment system is set forth in Attachment B.1, Section 2.2.2.1 of the of the BPSOU SOW.

## 2.4 Additional Project Requirements and Information to be Addressed in Remedial Design

1. **Railroad Easement:** Construction of a basin south of the railroad will require Group 1 SDs to coordinate with Group 2 SDs.
2. **Engineering Design:** Detailed design of the stormwater basin(s) and associated infrastructure, including the liner system(s), leak monitoring plan, surface grading, and detailed design of caps in accordance with this section.
3. **Excavation and Disposal Analysis:** The horizontal and vertical delineation of tailings, waste and contaminated soils, and other waste will be performed prior to remedial design. Pre-design investigation sampling shall be used to refine the location and extent of the removal area based on Appendix 1 criteria. The expected disposal quantities of tailings, waste, and contaminated soils shall be further investigated to select an appropriate repository location(s). The excavation and disposal plans shall be developed during the project design phase subject to EPA approval, in consultation with DEQ.
4. **Municipal Waste Characterization and Disposal Plan:** If municipal wastes are encountered at Buffalo Gulch, screening criteria shall be developed to accurately characterize and quantify municipal waste intended for disposal at the Butte-Silver Bow municipal landfill. Contingency excavation and disposal plans shall be developed during the project design phase subject to EPA approval, in consultation with DEQ.
5. **Backfill Material Characterization and Reuse Plan:** A sampling and analysis plan shall be developed to further delineate existing site soils that may be characterized and reused as suitable backfill material in accordance with Table 2 of Appendix 1, so long as such site materials do not exceed the Waste Identification Criteria in Table 1 of Appendix 1. If onsite materials do not exceed the Waste Identification Criteria in Table 1 of Appendix 1, the material may be used onsite as general fill provided it meets all other requirements for general fill of Table 2 of Appendix 1 (e.g., texture, pH). Blending of waste



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

material and clean material will not be allowed. All waste exceeding the Waste Identification Criteria in Table 1 of Appendix 1 will be disposed of off-site.

6. **Other Waste or Impacted Materials:** The presence and type of additional waste impacted materials within the perimeter of the project site is relatively unknown. Additional waste or impacted material that may be encountered includes hydrocarbons. Contingency excavation and disposal plans shall be developed during the project design phase subject to EPA approval, in consultation with DEQ.
7. **Geotechnical Conditions:** EPA, in consultation with DEQ, may require geotechnical investigation to adequately characterize subsurface conditions in areas of the basin(s), diversion structures, discharge structures or any other structural feature, or to optimize the horizontal extents of excavation and minimize off-site disposal of excavated materials.
8. **Other:** EPA, in consultation with DEQ, may identify additional design data gaps that may be identified during the design phase and require the SDs to address during design.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

### 3.0 NORTHSIDE TAILINGS / EAST BUFFALO GULCH AREA

A stormwater basin or sedimentation bay and vegetated swale shall be constructed after the removal of contaminated waste materials in the area of the Northside Tailings by the SDs to improve stormwater quality from the East Buffalo Gulch (EBG) sub-drainage area. A cover system shall also be constructed to support vegetative cover (see Figure NST-1). The required remedial activities are:

1. *Stormwater Basin or Sedimentation Bay, and Vegetated Swale* – Construction of a stormwater basin or sedimentation bay and vegetated swale designed to capture and treat, through the passive settling of sediments, sediment and contaminants in stormwater from the EBG sub-drainage area.
2. *Tailings, Waste, and Contaminated Soils Excavation, Removal, and Disposal* - Removal of all tailings, waste and contaminated soils that exceed the Waste Identification Criteria in Table 1 of Appendix 1 and as shown on Figure NST-1, which are unsaturated by groundwater to the maximum observed groundwater elevation surface as recorded over the most recent 3-year monitoring period.
3. *Regrading, Revegetation and Capping* – Regrading, vegetating, and constructing a cover system, in accordance with Table 3, of Appendix 1 and as shown on Figure NST-1.

#### 3.1 Remedial Construction Activities

##### 3.1.1 Stormwater Basin or Sedimentation Bay, Vegetated Swale

Stormwater from the EBG sub-drainage shall be diverted to a maintainable (concrete, or concrete-like) basin or sedimentation bay located at the Northside Tailings which shall be sized for a maximum 6-month, 24-hour Type I storm volume. In lieu of a larger basin, connection of the Northside Tailings basin or sedimentation bay with the stormwater basin(s) in Diggings East or Buffalo Gulch shall be included in the remedial design and construction. The final design shall be approved by EPA, in consultation with DEQ. Additional sediment storage volume beyond the stormwater capacity shall be included to maintain system performance and coincide with the O&M cleanout frequency, which shall occur a minimum of twice per year, or as necessary.

The basin or sedimentation bay shall be engineered and managed according to site ARARs, and the applicable requirements of Butte-Silver Bow's Municipal Stormwater Engineering Standards (BSBC 2011). If there are conflicting requirements, the SDs shall consult with EPA and DEQ, and EPA, in consultation with DEQ, will determine the appropriate requirement to follow, based on requirements included in the approved remedial design



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

work plan, unless specifically stated otherwise herein. The diversion structure between the outlet of the basin or bay and the Diggings East or Buffalo Gulch basins shall also be sized to accommodate the volume and peak discharge of a design storm between a 6-month, 24-hour Type I design storm and a 10-year, 24-hour Type I design storm. Discharge from the basin or bay shall be directed to Diggings East or Buffalo Gulch stormwater control structures to provide for optimal treatment and management of stormwater. When volumes of water from NST degrade the optimal treatment and management of stormwater entering the Diggings East or Buffalo Gulch, a diversion structure leading to a vegetated swale shall be utilized.

SDs shall perform a technical evaluation of the basin liner and infiltration that accounts for protection of the groundwater capture system (BPSOU subdrain), groundwater mounding concerns, impacts to neighbors and the surrounding area, and impacts on the integrity and/or capacity of the stormwater basin. The stormwater basin shall be lined if it is determined that infiltration could adversely affect surface water quality, groundwater capture, or neighboring properties. The evaluation will be approved by EPA in consultation with DEQ. A plan to monitor effects of leakage or infiltration shall also be developed during final design and approved by EPA, in consultation with DEQ.

The objective of the basin leak detection monitoring system is to assess leakage from the basin to Silver Bow Creek below the confluence with Blacktail Creek from infiltration of stormwater through adjacent tailings, wastes or contaminated soils and additional contaminant loading to groundwater. Monitoring and leak detection data shall be collected utilizing stormwater water balance, existing wells, and newly installed groundwater monitoring wells or alternate. Other leak detection technology/methods as approved by EPA, in consultation with DEQ may be used as an alternative to the stormwater balance. As necessary, groundwater monitoring wells shall be located downgradient, cross-gradient, and upgradient of the basin. SDs may additionally employ piezometers. The detection system shall be capable of detecting leakage at an appropriate rate to fully evaluate impacts of leakage or infiltration. The exact number, type, and location of monitoring wells, proposed analytes, and monitoring frequency shall be submitted to EPA for approval, in consultation with DEQ, as a component of the final design plan.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

If infiltration following basin construction is determined to have adverse effects as described above, the SDs shall generate a report describing the effects, and shall submit this report to EPA and DEQ. The report shall include recommended actions for corrections. Corrective measures directed by EPA, in consultation with DEQ, in response to this report shall be implemented by the SDs.

The vegetated bypass channel circumventing the basin or sedimentation bay shall be sized to adequately pass peak hydraulic flows in accordance with applicable Butte-Silver Bow Municipal Stormwater Engineering Standards (BSBC 2011), with the necessary measures to protect the cover system, and tailings, waste, and contaminated soils left in place from erosion. Lining, to prevent leakage to groundwater, of the diversion, discharge, and bypass channels is required.

### **3.1.2 Tailings, Waste, and Contaminated Soils Excavation, Removal, and Disposal**

The exact location of the stormwater basin or sedimentation bay, and channels shall be determined in design, and approved by EPA, in consultation with DEQ. The footprint of the proposed basin or sedimentation bay shall be positioned to maximize effectiveness of the basin or sedimentation bay and vegetated swale, efficiency of operation and maintenance activities, and shall consider the future land use for the Northside Tailings/East Buffalo Gulch area.

All materials within the project area, as shown on Figure NST-1, that exceed the Waste Identification Criteria in Table 1 of Appendix 1 will be removed and disposed of as described below. Vertical excavation of all tailings, waste, contaminated soils and other materials beneath these features shall occur to the maximum observed groundwater elevation as recorded over the most recent 3-year monitoring period. The horizontal and vertical delineation of tailings, waste and contaminated soils, other waste, and critical infrastructure will be performed prior to remedial design. Critical infrastructure will be protected during removal construction actions, and removal of waste around those features will not be required, as determined by EPA, in consultation with DEQ. Pre-design investigation sampling shall be used to refine the location of the removal area based on Appendix 1 criteria.

Unless suitable for use as backfill (under Appendix 1, Table 2), removed tailings, waste, and contaminated soils that exceed the Waste Identification Criteria in Table 1 of Appendix 1 shall be segregated and disposed of at a



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

repository approved by EPA, in consultation with DEQ, which is not located at the SBC-Above the Confluence or Blacktail Creek areas. Inert solid waste and construction debris may remain on-site for use as backfill that meets Table 2 of Appendix 1 criteria. All other municipal wastes, if encountered at the Northside Tailings/East Buffalo Gulch area, shall be segregated and disposed of at an appropriate permitted facility by the SDs.

### **3.1.3 Regrading, Revegetation and Capping**

Removed tailings, waste, and contaminated soils shall be replaced to existing or appropriate elevations with material suitable for establishing appropriate vegetation. Imported backfill and Engineered Cap materials shall meet Backfill and Cover System Material Suitability Criteria in Table 2 and Table 3 of Appendix 1. If onsite materials do not exceed the waste identification criteria in Table 1 of Appendix 1, the material may be used onsite as general fill provided it meets all other requirements for general fill in Table 2 of Appendix 1 (e.g., texture, pH). Blending of waste material and clean material will not be allowed. All waste exceeding Table 1 will be disposed of off-site.

Regrading shall be conducted on the areas outside of the basin or sedimentation bay to produce a landscape suitable for the determined future land use of the Northside Tailings area, subject to consistency with the BPSOU remedial action objectives (RAOs). The future land use shall be coordinated with Butte-Silver Bow County and will be evaluated by EPA in consultation with DEQ, by looking at information such as local ordinances and zoning, patterns of development in the area, and information from local planning officials and information provided by the public.

For landscaping purposes, a maximum additional 10 percent of the imported cap material volume over the fill required by the remedial design shall be provided to accommodate the future land use, if needed. The additional soil for landscaping purposes shall meet the General Fill Criteria B requirements in Table 2 of Appendix 1. A cover system with an appropriate capillary break, where necessary, shall be constructed on all property delineated on Figure NST-1. The cover system shall be constructed in accordance with the criteria set forth in Table 3 of Appendix 1. For the areas internal to the basin or sedimentation bay, vegetated swale, and bypass channel, soil meeting the Material Suitability Criteria, Riparian Growth Media (Appendix 1) shall be used.

Modification of this design description may be implemented in coordination and support of future land use proposed features (e.g., maintenance access



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

road, parking lot, trail, etc.), and subject to EPA approval, in consultation with DEQ. These modifications may require placement of structural sub-base course. Specific requirements and specific design of the cover system and cover sections shall be developed during the design phase of the project, subject to EPA approval in consultation with DEQ. Should any additional measures be required to maintain the effectiveness of the BPSOU groundwater capture system, as a result of this action, these shall be developed in the design phase of the project, subject to EPA approval in consultation with DEQ, as described below.

### **3.2 Institutional Control Considerations**

Through the planning and design process, certain institutional controls may be identified and described in the remedial design plan. The implementation of any institutional control shall involve a cooperative effort among local government, state government, SDs, and other stakeholders, and shall be the responsibility of the SDs. Potential institutional controls may include motorized and non-motorized travel restrictions, sensitive area exclosures, and future site development restrictions. Fencing or other access restrictions may also be identified.

Any existing institutional controls (including the CGWA) will remain in effect, including throughout construction.

### **3.3 Potential Impacts to Existing Remedial Components**

Construction of the basin or sedimentation bay is not expected to adversely impact performance of the existing of the BPSOU groundwater remedy within the SBC-Above the Confluence corridor. Evaluation of the existing remedial performance of the subdrain capture and treatment system(s) in BPSOU shall be conducted following the 4<sup>th</sup> and final cycle BMP implementation and prior to KRECCR approval. The evaluation will determine if any upgrades to the existing system(s) are needed. Any upgrades proposed by the SDs are subject to the approval of EPA, in consultation with DEQ, and shall be implemented upon such approval. Further discussion of the evaluation of the remedial performance of the subdrain capture and treatment system is set forth in Attachment B.1, Section 2.2.2.1 of the BPSOU SOW.

### **3.4 Additional Project Requirements and Information to be Addressed in Remedial Design**

1. **Engineering Design:** Detailed design of the basin or sedimentation bay and associated, vegetated and lined, bypass and discharge swales.
2. **Excavation and Disposal Analysis:** The horizontal and vertical delineation of tailings, waste and contaminated soils, and other waste will be performed prior



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

to remedial design. Pre-design investigation sampling shall be used to refine the location and extent of the removal area as shown on Figure NST-1 and based on Appendix 1 criteria. The expected disposal quantities of site tailings, waste, and contaminated soils shall be used to select an appropriate repository location. The excavation and disposal planning shall be evaluated during the project design phase subject to EPA approval, in consultation with DEQ.

3. **Municipal Waste Characterization and Disposal Plan:** Screening criteria shall be developed to accurately characterize and quantify municipal waste intended for disposal at the Butte-Silver Bow municipal landfill. Contingency excavation and disposal planning shall be evaluated during the project design phase.
4. **Backfill Material Characterization and Reuse Plan:** A sampling and analysis plan shall be developed to further delineate existing site soils that may be characterized and reused as suitable backfill material in accordance with Table 2 of Appendix 1.
5. **Other Waste or Impacted Materials:** The presence and type of additional tailings, waste, and contaminated soils within the perimeter of the project site is relatively unknown. Additional tailings, waste, and contaminated soils may be encountered during performance of the work. Contingency excavation and disposal planning shall be evaluated during the project design phase. If onsite materials do not exceed the Waste Identification Criteria in Table 1 of Appendix 1, the material may be used onsite as general fill provided it meets all other requirements for general fill in Table 2 of Appendix 1 (e.g., texture, pH). Blending of waste material and clean material will not be allowed. All waste exceeding the Waste Identification Criteria in Table 1 of Appendix will be disposed of off-site.
6. **Geotechnical Conditions:** EPA, in consultation with DEQ, may require geotechnical investigation to adequately characterize subsurface conditions in areas of the basin or sedimentation bay, diversion structures, discharge structures, vegetated swale, or other structural features to optimize the horizontal extents of excavation and minimize off-site disposal of materials. SDs may also propose such investigations in design documents.
7. **Other:** EPA, in consultation with DEQ, may identify additional data gaps that may be identified during the design phase and require the SDs to address during design. SDs may also propose such data gaps.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

#### 4.0 GROVE GULCH SEDIMENTATION BAY

A sedimentation bay and vegetated swale shall be constructed by the SDs along the eastern edge of Lexington Avenue to address stormwater from the Grove Gulch sub-drainage area. The remedial activity is:

1. *Stormwater Sedimentation Bay and Vegetated Swale* – Construction of a stormwater sedimentation bay and vegetated swale designed to treat stormwater from the 6-month, 24-hour Type I storm from the Grove Gulch sub-drainage area.
2. *Tailings, Waste, and Contaminated Soils Excavation, Removal, and Disposal* - Removal of all tailings, waste and contaminated soils that exceed the Waste Identification Criteria in Table 1 of Appendix 1, which are unsaturated by groundwater, encountered beneath the sedimentation bay and vegetated swale to the maximum observed groundwater elevation surface as recorded over the most recent 3-year monitoring period in the area shown on Figure GG-1.
3. *Regrading, Revegetation and Capping* – Regrading, vegetating, and constructing a cover system in any areas disturbed during construction, in accordance with Table 3, of Appendix 1 and as shown on Figure GG-1.

#### 4.1 Remedial Construction Activities

##### 4.1.1 Stormwater Sedimentation Bay and Vegetated Swale

Stormwater from the Grove Gulch sub-drainage (which reports to Blacktail Creek at point GG-01) shall be directed to a maintainable (concrete, or similar) sedimentation bay located on the eastern edge of Lexington Avenue. The bay shall be sized to capture one acre-foot of runoff volume from the Grove Gulch watershed. Additional sediment storage volume beyond the stormwater capacity shall be included to maintain system performance and coincide with the O&M cleanout frequency, which shall be defined during the design.

The sedimentation bay shall be engineered and managed according to site ARARs, and the applicable requirements of Butte-Silver Bow's Municipal Stormwater Engineering Standards (BSBC 2011). If there are conflicting requirements, the SDs shall consult with EPA and DEQ, and EPA, in consultation with DEQ, will determine the appropriate requirement to follow, based on requirements included in the approved remedial design work plan, unless specifically stated otherwise herein. Discharge from the bay shall be directed through a vegetated swale prior to entering Blacktail Creek (see Figure GG-1). The vegetated swale shall be designed to the 6-month 24-hour storm for treatment purposes. A vegetated bypass channel circumventing the sedimentation bay shall be sized, at a minimum, to



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

adequately pass peak hydraulic flows in accordance to Butte-Silver Bow's Municipal Stormwater Engineering Standards (BSBC 2011) using the USGS regressions equations to protect the design from high flow events.

**4.1.2 Tailings, Waste and Contaminated Soils Excavation, Removal, and Disposal**

If tailings, wastes and contaminated soils that exceed the Waste Identification Criteria in Table 1 of Appendix 1 are encountered within the footprint of the sedimentation bay, swale, and/or bypass channel to Blacktail Creek, then these wastes shall be removed down to the maximum observed groundwater elevation as recorded over the most recent 3-year monitoring period.

All materials below the sedimentation bay, vegetated swale, or bypass channel that exceed the Waste Identification Criteria in Table 1 of Appendix 1 will be removed and disposed of as described in the paragraph below. If tailings, waste, and contaminated soils are encountered outside of the sedimentation bay outside the floodplain then they will be capped using cover system requirements of Table 3 of Appendix 1. The horizontal extent of sedimentation bay excavation is limited to the exterior wall of the sedimentation bay with additional accommodation of excavation layback as dictated by the angle of repose of the material being removed. Tailings, waste, and contaminated soils encountered outside of the sedimentation bay within the floodplain will be removed and disposed of as described in the paragraph below. The horizontal extent of vegetated swale and bypass channel excavation is limited to the design flow channel widths with additional accommodation of excavation layback as dictated by the angle of repose of the material being removed that allows placement of clean fill material in and around the channel. Critical infrastructure will be protected during removal construction actions, and removal of waste around those features will not be required, as determined by EPA, in consultation with DEQ. Pre-design investigation sampling shall be used to refine the location of the removal area based on Appendix 1 criteria.

Unless suitable for use as backfill (under Appendix 1, Table 2), removed tailings waste and contaminated soils shall be segregated and disposed of at a repository approved by EPA in consultation with DEQ, which is not located in the SBC-Above the Confluence or Blacktail Creek areas. Inert solid waste and construction debris may remain on-site for use as backfill that meets Table 2 of Appendix 1 criteria. All other municipal wastes, if



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

encountered at the Grove Gulch area, shall be segregated and disposed of at an appropriate permitted facility by the SDs.

#### **4.1.3 Regrading, Revegetation and Capping**

Regrading shall be conducted on the areas outside of the sedimentation bay, and swale, and channel as needed to provide operation and maintenance access, and to support appropriate vegetation. If wastes are encountered outside of the sedimentation bay in the Grove Gulch area outside the floodplain then they will be capped using the cover system requirements of Table 3, Criteria D of Appendix 1.

Modification of this design description may be implemented in coordination and support of proposed features (e.g., maintenance access road, parking lot, trail, etc.) consistent with listed design elements, and subject to EPA approval, in consultation with DEQ. These modifications may require placement of structural sub-base course. Specific requirements for regrading and revegetation shall be developed during the design phase of the project, subject to EPA approval in consultation with DEQ.

#### **4.2 Institutional Control Considerations**

Through the planning and design process, certain institutional controls shall be identified and described in the remedial design plan. The implementation of any institutional control for this area will involve a cooperative effort among local government, state government, SDs, and other stakeholders, and shall be the responsibility of the SDs. Potential institutional controls may include motorized and non-motorized travel restrictions, sensitive area exclosures, and future site development restrictions. Fencing or other access restrictions may also be identified.

Any existing institutional controls will remain in effect and adhered to throughout construction and following construction completion.

#### **4.3 Additional Project Requirements and Information to be Addressed in Remedial Design**

- 1. Other Waste or Impacted Materials:** The presence and type of additional wastes or contaminated materials within the perimeter of the project site is unknown. Additional wastes or contaminated materials may be encountered during performance of the work. Contingency excavation and disposal planning shall be evaluated during the project design phase.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

2. **Engineering Design:** Detailed design of the stormwater sedimentation bay and associated vegetated bypass and treatment swales and associated regrading and vegetative soil cover plans.
3. **Excavation and Disposal Feasibility:** The expected quantities of site materials for disposal shall be further investigated to select an appropriate repository location.
4. **Backfill Material Characterization and Reuse Plan:** A sampling and analysis plan shall be developed to further delineate existing site soils that may be characterized and reused as suitable backfill material in accordance with Table 2 of Appendix 1, so long as such site materials do not exceed the Waste Identification Criteria in Table 1 of Appendix 1. If onsite materials do not exceed the Waste Identification Criteria in Table 1 of Appendix 1, the material may be used onsite as general fill provided it meets all other requirements for general fill in Table 2 of Appendix 1 (e.g., texture, pH). Blending of waste material and clean material will not be allowed. All waste exceeding Waste Identification Criteria in Table 1 of Appendix 1 will be disposed of off-site.
5. **Geotechnical Conditions:** EPA, in consultation with DEQ, may require geotechnical investigation to adequately characterize subsurface conditions in areas of the sedimentation bay, vegetated swale, diversion structures, discharge structures or other structural features. SDs may also propose such investigation in design documents.
6. **Other:** EPA, in consultation with DEQ, may identify additional data gaps during the design phase and require SDs to address during design. SDs may also propose such data gaps.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## 5.0 BLACKTAIL CREEK REMEDIATION AND CONTAMINATED GROUNDWATER HYDRAULIC CONTROL

The objective of the remedial activities described below for the Blacktail Creek area is to remove tailings, wastes, contaminated soils and sediments from Blacktail Creek and Silver Bow Creek below the confluence with Blacktail Creek, including the Blacktail Creek wetlands, and control discharge of contaminated groundwater to surface water in the area, as depicted in Figure BTC-1. Remedial activities at the Blacktail Creek and confluence area shall include:

1. *Remove All Tailings, Waste, and Contaminated Soils* – The State, through the Montana Department of Environmental Quality (DEQ), shall remove all tailings, wastes, contaminated soils, and sediments that exceed the Waste Identification Criteria in Table 1 of Appendix 1, in and along Blacktail Creek and Silver Bow Creek below the confluence with Blacktail Creek and their 100-year floodplains, as delineated in Figure BTC-1.
2. *Control Contaminated Groundwater* – The SDs shall control discharge of contaminated groundwater to surface water and sediments in the BTC area. The initial contaminated groundwater control is generally depicted in Figure BTC-1. Removal of waste materials contributing to groundwater contamination within the BTC area is anticipated through remedial actions identified in item 1. However, some areas north of Blacktail Creek, outside of the floodplain, are known to contain tailings, waste, and/or contaminated soils. Initially, approximately 100 gallons per minute (gpm) of contaminated groundwater will be collected to control discharge to surface water. The goals for the control of contaminated groundwater in this BTC area are to reduce ongoing and potential future groundwater loading of contaminants of concern to sediments and surface water as outlined in the Surface Water Management Plan (SWMP). Following remedy implementation, further evaluation by the SDs shall be conducted to allow EPA to determine, in consultation with DEQ, if additional groundwater collection is required in accordance with the SWMP to control contaminated groundwater discharge to surface water and sediments as specifically described below (*Control Contaminated Groundwater (SDs Responsibilities)*) in the BTC area. Collected contaminated groundwater will be treated at the Butte Treatment Lagoons (BTL) facility, and/or an alternative groundwater treatment facility or approach, as approved by EPA, in consultation with DEQ.
3. *Reconstruct Blacktail Creek and Silver Bow Creek Below the Confluence with Blacktail Creek* – DEQ shall replace removed tailings, wastes, contaminated soils, and in-stream sediments with suitable clean soils. DEQ shall also reconstruct Blacktail Creek and Silver Bow Creek below the confluence with Blacktail Creek and their beds, banks, and 100-year floodplains. DEQ shall also revegetate areas addressed by these



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

restoration and remedial actions in accordance with the Material Suitability Criteria in Appendix 1.

## **5.1 Remedial Construction Activities**

### **5.1.1 Remove All Tailings, Waste, Contaminated Sediments and Soils (DEQ Responsibilities)**

All groundwater saturated and groundwater unsaturated tailings, waste, and contaminated soils shall be removed from the 100-year flood plain extending from the Lexington Avenue culverts to the George Street Culverts, as depicted in Figure BTC-1. Contaminated in-stream sediments shall be removed from just upstream of the Blacktail Creek and Grove Gulch confluence to the Montana Street Bridge as depicted in Figure BTC-1. Removal in the area from the east side of Lexington Avenue to 250-feet north just past Grove Gulch as depicted on Figure BTC-1, shall also include contaminated bank materials, if any.

Tailings, wastes, contaminated soils, and contaminated in-stream sediments shall be defined by the Waste Identification Criteria in Table 1 of Appendix 1. The vertical and lateral extent of removals will be determined following a pre-design investigation to delineate tailings, wastes, and contaminated soils and sediments within the areas on Figure BTC-1. Current data do not indicate the need for vertical excavation depths beyond approximately 5 feet below local groundwater elevations, especially moving further to the east towards Lexington Avenue, although data gaps exist regarding the extent. The removal extent shall take into consideration actions described in 5.1.2 and 5.1.3 of this Blacktail Creek Remediation and Contaminated Groundwater Hydraulic Control scope of work. Critical infrastructure will be protected during removal construction actions, and removal of waste around those features will not be required, as determined by EPA, in consultation with DEQ.

The State, through DEQ, will similarly remove tailings, waste, and contaminated soils and reconstruct Blacktail Creek and Silver Bow Creek below the confluence with Blacktail Creek and its 100-year floodplain in the “Confluence Area” north of George Street and east of Montana Street as shown in Figure BTC-1. The work extending into the Confluence Area is a restoration project integrated with the BPSOU remedy, and will be exempt from permitting requirements under CERCLA Section 121(e), and will be conducted under EPA oversight only to the extent needed to oversee and coordinate remedial actions within BPSOU.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

All removed tailings, wastes, and contaminated soils, including in-stream sediments, shall be disposed by DEQ in an acceptable repository or repositories, provided by the SDs for up to 200,000 cubic yards, approved by EPA, in consultation with DEQ, and not located in Silver Bow Creek above its confluence with Blacktail Creek, or BRW areas. Further detail related to SDs' identification and development of an acceptable repository and payments by SDs to DEQ, in the event SDs do not identify and develop a repository at Timber Butte, as provided in Paragraph 20 of the Consent Decree.

All encountered municipal wastes (including household trash, demolition debris, timbers, brick, concrete and other non-soil materials) shall be segregated and disposed of at an appropriate permitted facility. Municipal waste may not be used as backfill material. Only those excavated soils meeting the criteria in Table 2 of Appendix 1 may be reused on-site, in the locations defined by the criteria in the table. DEQ shall manage construction de-watering water from the Confluence Area and BTC projects on site where feasible. AR will take the State's BTC Riparian Actions construction de-watering water at the Butte Treatment Lagoons to the extent treatment is needed and at times when the volume and chemistry of such water will not overwhelm the Butte Treatment Lagoons' capacity and/or prevent it from meeting discharge standards, as approved by EPA during Remedial Design. Construction water meeting temporary variance standards does not require treatment.

#### **5.1.2 Control Contaminated Groundwater (SDs Responsibilities)**

Contaminated groundwater is known to exist in wells located to the south of the Visitor's Center and exposed tailings are present along the walking path potentially above and outside of the floodplain of Blacktail Creek. Recent pore water and other sampling data indicate groundwater in this area is adversely affecting surface water quality in this reach of Blacktail Creek.

Contaminated groundwater north of the Blacktail Creek area to the BPSOU subdrain capture area shall be controlled from discharging to surface water at an initial rate of approximately 100 gpm. The goals for the control of contaminated groundwater in this BTC area are to reduce ongoing and potential future groundwater loading of contaminants of concern to sediments and surface water as outlined in the SWMP. EPA, in consultation with DEQ, will determine the effectiveness of contaminated groundwater control in the BTC area in accordance with the SWMP by:



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- a) Comparison of sediment concentrations to probable effects concentration (PEC) threshold values identified in the SWMP, Exhibit 1 to Attachment A of the BPSOU SOW;
- b) Comparison of surface water quality to water quality standards at performance and compliance monitoring stations, which are identified in the SWMP;
- c) Interpretation of groundwater gradients; and
- d) Interpretation of groundwater quality as it relates to impacts to sediment and surface water quality.

EPA, in consultation with DEQ, will determine the extent and location of groundwater control to be constructed following a pre-design investigation and completion of the groundwater capture optimization study. Based upon the results of the pre-design investigation and groundwater capture optimization study, the quantity of groundwater capture may be greater or less than the initially estimated 100 gpm, and the location of capture may differ from that generally depicted on Figure BTC-1. Following remedy implementation, further evaluation by the SDs shall be conducted to allow EPA to determine, in consultation with DEQ, if additional groundwater collection is required in accordance with the SWMP to control contaminated groundwater discharge in the BTC area to surface water and sediments. The procedures and criteria for future assessment and evaluation of sediment loading within the reconstructed Blacktail Creek streambed are further described in the SWMP. The SWMP will be followed in determining whether future sediment removals or further groundwater control is required.

The exact means of groundwater control cannot be determined based on existing available data. However, control of contaminated groundwater is required in areas where all tailings, wastes, and contaminated soils have not been removed to limit contaminated groundwater from discharging to the creeks. Depending on the findings of further investigation, control of groundwater may be accomplished by hydraulic capture and treatment, and/or other methods to be approved by EPA in consultation with DEQ.

Design of the initial contaminated groundwater control system (approximately 100 gpm) shall consider and account for interference with or enhancement of the BPSOU Subdrain. Any groundwater collected shall be conveyed to a treatment system, whether the existing BTL system, a modified or expanded BTL system, or an alternative system as approved by



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

EPA, in consultation with DEQ. Monitoring shall be implemented to assess protection of surface water and sediments as described in the SWMP. Other contaminated groundwater control alternatives such as permeable reactive barriers or drains to intercept or otherwise treat contaminated groundwater in-situ may be considered.

**5.1.3 Reconstruct Blacktail Creek and Silver Bow Creek Below the Confluence with Blacktail Creek (DEQ Responsibilities)**

Removed tailings, wastes, contaminated soils, and in-stream sediments shall be replaced with replacement soils which meet criteria defined in Table 2 of Appendix 1, according to the location of the media to be replaced (i.e., Riparian or In-Stream Sediment). The reconstructed channel and floodplain, including the bankfull channel depth, shall be constructed according to appropriate design considerations, and shall be designed to accommodate the 100-year base flood event with a minimum flow design. Streambed materials present within the channel of the final stream alignment at construction completion must also meet Criteria C in Table 2 of Appendix 1 if the sediments are at or above a two-foot scour depth with an added factor of safety to be determined during remedial design.

For Blacktail Creek, the minimum flow design shall be 372 cubic feet per second (cfs; TREC, Oct. 18, 2016). For Silver Bow Creek below the confluence with Blacktail Creek, the minimum flow design shall be 493 cfs. Soft armoring may be utilized to control lateral migration at the margins of the constructed floodplain. The extent of soft armoring will be determined during remedial design.

The position or meander of the reconstructed Blacktail Creek channel, including floodplain alteration from approximate existing conditions, may be an integral part of the overall groundwater control item described above. Although changes to the existing culverts are not anticipated, relocation of the channel away from contaminated ground water may be integrated with other measures to prevent discharge of contaminated groundwater to Blacktail Creek. Geomorphic principles shall be used in design of the creek floodplain, to the extent practicable based on these boundary conditions and to provide bank and floodplain stabilization. Replacement of the Blacktail Creek wetland is not required; however, the “no net loss” of wetlands ARAR shall be adhered to through use of a Clark Fork Basin wide accounting approach. In addition, the area shall be incorporated into the overall reconstructed floodplain design, and shall accommodate groundwater or other flows that emanate into the area.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

All areas addressed by this action shall be reconstructed and revegetated in accordance with ARARs. The revegetation plan shall be described in the design documents and is subject to approval by EPA, in consultation with DEQ.

As described above, all work that extends into the Confluence Area is a restoration project integrated with the BPSOU remedy, and will be exempt from permitting requirements under CERCLA Section 121(e), and will be conducted under EPA oversight only to the extent needed to oversee and coordinate remedial actions within BPSOU.

## **5.2 Institutional Control Considerations**

Through the planning and design process, certain institutional controls shall be identified and described in the remedial design plan. The implementation of any institutional control for this area shall be a cooperative effort among local government, state government, SDs, and other project stakeholders, and shall be the responsibility of the SDs. Potential institutional controls may include motorized and non-motorized travel restrictions, sensitive area enclosures, and future site development restrictions. Fencing or other access restrictions may also be identified. Any existing institutional controls (including the CGWA) shall remain in effect, including throughout construction.

## **5.3 Additional Project Requirements and Information to be Addressed in Remedial Design**

Site-specific data shall be required to refine the following:

1. **Engineering Design:** Detailed analysis and design of the contaminated materials removal and replacement with clean materials, including existing and post-remediation hydraulic design through the reach. This includes further delineation of the nature and extent of tailings, waste, and contaminated soils that exceed the waste identification criteria in Table 1. Specific areas that have been identified as having data gaps include the wetland area south of the Blacktail Berm and the area north of Blacktail Creek to the BPSOU subdrain capture area in the vicinity of the Visitor's Center.
2. **Excavation and Disposal Analysis:** The total expected disposal quantities of tailings, waste, and contaminated soils shall be further investigated to select an appropriate repository location(s). Contingency excavation and disposal plans shall be developed during the project design phase subject to EPA approval, in consultation with DEQ.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

3. **100-year Flow:** The 100-year flow rate through the remedial reach of Blacktail Creek and Silver Bow Creek below the confluence with Blacktail Creek shall be calculated through appropriate Bulletin 17B statistical analysis of data available from the USGS stream gage site 12323240 (SS-04).
4. **100-year Base Flood Elevation<sup>1</sup>:** The 100-year flood elevation of the new shall be determined based on the calculated 100-year flow via appropriate hydraulic modeling method. All connected areas below this elevation shall be considered in the “100-year floodplain.” Additional survey information may be required to complete this modeling.
5. **Soil Replacement Materials:** All replacement floodplain and in-stream materials shall meet the appropriate specifications in the Material Suitability Criteria in Appendix 1.
6. **Repository Location and Transport Route:** All removed materials shall be safely transported to an acceptable repository or repositories approved by EPA, in consultation with DEQ. The remedial design shall identify the location of the repository and the appropriate and safe transport route for removed wastes, contaminated soils and tailings.
7. **Soft Armoring:** Design of a soft armor bank shall be completed based on hydraulic modelling results.
8. **Vegetative Materials:** Appropriate native vegetative materials, to the extent practicable, shall be determined to suit the area being planted, including considerations of upland, riparian, wetland, and sub-irrigated locations.
9. **Construction Planning and Evaluation:** More detailed evaluation of the quantity, requirements, dewaterability, and geotechnical properties of the material to be removed shall be necessary prior to detailed design and implementation.
10. **Geotechnical Conditions:** EPA, in consultation with DEQ, may require geotechnical investigation to adequately characterize subsurface conditions in areas near bridges and culverts, and/or other structural features. SDs may also propose such investigations in design documents.

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<sup>1</sup> Note that the calculated 100-year flow and the resulting modeled 100-year base flood elevation may differ from the FEMA defined 100-year flow and associated floodplain. For the purposes of the remedial design, the calculated 100-year flow and modeled 100-year water level and flood width will be used, not the FEMA defined flows and floodplain.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

11. **Achievement of RAOs:** Construction of the prescribed remedy is expected to contribute to achievement of RAOs. The total contribution and effectiveness of the Blacktail Creek remediation may not be fully quantifiable until all remedial activities associated with surface water have been constructed and optimized.
12. **Site Programming and Master Plan:** To facilitate coordination between remedial and restoration activities as well as land use development, it is necessary for project stakeholders to engage in discussions regarding final site conditions and intended end land use objectives. Project benefits may be obtained by all stakeholders and within all phases of the work through comprehensive site planning.
13. **Municipal Waste Characterization and Disposal Plan:** Screening criteria must be developed to accurately characterize and quantify municipal waste intended for disposal at a permitted facility.
14. **Other Waste Materials:** In addition, the presence of other types of contamination (e.g., landfill, RCRA, organic, etc.) in soils at Blacktail Creek area may impact the disposal of the material. This issue shall be addressed in during remedial design.
15. **Other:** Data gaps that may be identified during the design phase.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**6.0 BUTTE REDUCTION WORKS SMELTER AREA MINE WASTE  
REMEDIATION AND CONTAMINATED GROUNDWATER HYDRAULIC  
CONTROL**

The objective of the remedial activities described below for the portion of the Butte Reduction Works (BRW) Smelter Area not addressed as part of the Lower Area One (LAO) Expedited Response Action (See Figure BRW-1) is to protect Silver Bow Creek below the confluence with Blacktail Creek (SBC-Below the Confluence) by removing all tailings, waste, contaminated soils, and slag from the BRW Smelter Area in a corridor that will contain a new channel for Silver Bow Creek, hydraulically controlling and treating contaminated groundwater at the site, and realigning SBC-Below the Confluence, as generally depicted on Figure BRW-1 and as described further below. Initial groundwater controls are generally depicted on Figure BRW-1, and the SWMP allows EPA to require future additional groundwater control, as described therein. These remedial activities shall be conducted by the SDs.

All Tailings, waste, contaminated soils, and slag from the BRW Smelter Area shall be removed from the area identified on Figure BRW-1. Where tailings, waste, contaminated soils, and slag are left in place, the contaminated groundwater which results from these wastes shall be hydraulically controlled from discharge to SBC-Below the Confluence, including a groundwater collection and conveyance system. Physical barriers (such as a native clay material or geosynthetic liner) may be added to further protect the groundwater remedy from infiltration as allowed by State ARARs. The required remedial activities are:

1. *Tailings, Waste, Contaminated Soils, Slag Excavation, Removal, and Disposal* – Removal of all tailings, waste, contaminated soils and slag that exceed the Waste Identification Criteria in Table 1 of Appendix 1 within the removal corridor as generally designated on Figure BRW-1 by the SDs. The width of the removal corridor shall be an average of 275 feet beginning at the toe of the railroad extending north into the BRW Smelter Area.
2. *Hydraulically Control and Treat Contaminated Groundwater within the BRW Smelter Area* - The SDs shall control discharge of contaminated groundwater to surface water and sediments in BPSOU generally and in the BRW Smelter Area specifically. The initial contaminated groundwater control is generally depicted in Figure BRW-1. Removal of source waste materials contributing to groundwater contamination at the BRW Smelter Area is anticipated through remedial actions identified in item 1. However, some areas outside of the reconstructed SBC-Below the Confluence floodplain, are known to contain tailings, waste, and/or contaminated soils. The goals for the control of contaminated groundwater in this area are to reduce ongoing and potential future groundwater loading of contaminants of concern to sediments and surface water as outlined in the SWMP. Following remedy implementation, further



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

evaluation by the SDs shall be conducted to allow EPA, in consultation with DEQ, to determine if additional groundwater collection is required in accordance with the SWMP to control contaminated groundwater discharge to surface water and sediments. Collected contaminated groundwater will be treated at the Butte Treatment Lagoons (BTL) facility, and/or an alternative groundwater treatment facility or approach, as approved by EPA, in consultation with DEQ.

3. *Realign Silver Bow Creek Below the Confluence with Blacktail Creek and Construct 100-Year Floodplain* – The SDs shall relocate SBC-Below the Confluence and construct the associated 100-year floodplain in a new alignment through the BRW Smelter Area from Montana Street to the reconstructed LAO area as shown on Figure BRW-1. The creek shall be located away from existing slag walls and associated contaminated sediments. This SBC-Below the Confluence realignment shall be designed so that contaminated groundwater is hydraulically controlled as described below. Lining of the reconstructed stream may be considered for this purpose.
4. *Regrade and Construct Cap(s)* – The SDs shall regrade and construct an appropriate cap over tailings, waste, contaminated soils, and slag left in place to ensure protectiveness of human health and surface water, and acceptability for future land uses consistent with this remedial action for the BRW Site. Capped areas shall be outside of the 100-year floodplain and shall meet the Engineered Cap requirements of Table 3 of Appendix 1.

## 6.1 Remedial Construction Activities

### 6.1.1 Remove Tailings, Waste, Contaminated Soils, and Slag at the BRW Smelter Removal Areas

Remove all tailings, waste, contaminated soils and slag that exceed the Waste Identification Criteria in Table 1 of Appendix 1 within the removal corridor.

An excavation surface (subject to EPA approval, in consultation with DEQ) shall be developed during design and will consider the results of the pre-design investigation. The excavation surface will define the vertical extent of removal within the removal corridor. The width of this removal area shall be an average of 275 feet from the toe of the south railroad grade, as shown on Figure BRW-1, and shall be sufficient to accommodate the relocation of SBC-Below the Confluence with a base flow channel and 100-year floodplain, similar to the reconstructed channel and floodplain in the LAO area downstream. All soils contaminated with organic wastes encountered within the excavation extent shall also be removed and disposed of as described below. Critical infrastructure will be protected during removal



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

actions, and removal of waste around those features will not be required, as determined by EPA, in consultation with DEQ.

Unless suitable for use as backfill (under Appendix 1, Table 2), removed tailings, waste, contaminated soils, and slag shall be segregated and disposed of at a repository approved by EPA, in consultation with DEQ, which shall not be located in SBC-Above the Confluence above its confluence with Blacktail Creek, or BRW Smelter Area. Tailings, waste, contaminated soils, and slag mixed with organic wastes (including organic contamination) at the BRW Smelter Removal Area, shall be segregated and disposed of at an appropriate permitted facility, or may be land-farmed at or adjacent to the EPA-approved repository in compliance with ARARs. Organic wastes in soils at the BRW Smelter Removal Areas, shall be segregated and disposed of appropriately by the SDs. Any dissolved phase or free product organic contamination found in groundwater shall also be properly addressed by the SDs. SD's shall complete the remediation of organic waste at the BRW in a manner that is complimentary and not inconsistent with the CERCLA remedy.

Removed tailings, waste, contaminated soils, and slag shall be replaced to existing or appropriate elevations in and outside of the floodplain with material suitable for protection of SBC-Below the Confluence and for establishing appropriate native vegetation. These materials shall meet the requirements as defined by Appendix 1, Table 2, as applicable for the location of the material being replaced.

**6.1.2 Hydraulically Control and Treat Contaminated Groundwater within the BRW Smelter Area**

Contaminated groundwater within the BRW Smelter Area specifically and BPSOU in general shall be controlled from discharging to site surface water, limiting the loading of contaminants of concern in groundwater to sediments or surface water as outlined in the SWMP. EPA, in consultation with DEQ, will determine, the effectiveness of contaminated groundwater control in the BRW area in accordance with the SWMP by:

- a) Comparison of sediment concentrations to probable effects concentration (PEC) threshold values identified in the SWMP, Exhibit 1 to Attachment A of the BPSOU SOW;
- b) Comparison of surface water quality to water quality standards at performance and compliance monitoring stations, which are identified in the SWMP;



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- c) Interpretation of groundwater gradients; and
- d) Interpretation of groundwater quality as it relates to impacts to sediment and surface water quality.

The extent and location(s) of groundwater control to be constructed will be determined following a pre-design investigation and completion of the groundwater capture optimization study. The location of capture may differ from that generally depicted on Figure BRW-1. Following remedy implementation, further evaluation by the SDs shall be conducted for EPA, in consultation with DEQ, to determine if additional groundwater collection is required in accordance with the SWMP to control contaminated groundwater discharge to surface water and sediments. The procedures and criteria for future assessment and evaluation of sediment loading within the reconstructed SBC-Below the Confluence streambed in the BRW Smelter Area are further described in the SWMP. The SWMP will be followed in determining whether future sediment removals or further groundwater control is required.

The exact means of groundwater control cannot be determined based on existing available data. However, control of contaminated groundwater is required in areas where all tailings, wastes, and contaminated soils have not been removed to limit contaminated groundwater from impacting surface water and sediments. Depending on the findings of further investigation, control of groundwater may be accomplished by hydraulic capture and treatment, and/or other methods to be approved by EPA in consultation with DEQ.

Design of the initial contaminated groundwater control system shall consider and account for interference with or enhancement of other groundwater capture systems. Any groundwater collected shall be conveyed to a treatment system, whether the existing BTL system, a modified or expanded BTL system, or an alternative system as approved by EPA, in consultation with DEQ. Monitoring shall be implemented to assess protection of surface water and sediments as described in the SWMP. Other contaminated groundwater control alternatives such as permeable reactive barriers or drains to intercept or otherwise treat contaminated groundwater in-situ may be considered.

All contaminated groundwater collected shall be conveyed to, and treated in, the BTL facility, as modified, if necessary.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**6.1.3 Realign Silver Bow Creek Below the Confluence with Blacktail Creek and Construct 100-Year Floodplain**

Silver Bow Creek from Montana Street to the reconstructed LAO area shall be re-constructed in the excavated area described above, and designed with a floodplain adequate to contain the peak flow resulting from a 100-year flood event with a minimum capacity to convey 493 cfs (TREC, October 18, 2016). This shall be done to relocate the channel away from contaminated in-stream sediments, provide a new alignment in a location where tailings, waste, contaminated soils, and slag have been removed, and aid the hydraulic control of contaminated groundwater (described previously). Soft armoring may be utilized to limit lateral migration within and at the margins of the reconstructed floodplain. The reconstruction of SBC-Below the Confluence shall isolate remaining waste left in place from a 100-year flood event to comply with solid waste requirements and other location and action-specific ARARs. Lining of the reconstructed stream may be considered to reduce capture and treatment of surface water. Streambed materials present within the channel of the final stream alignment at construction completion must also meet Criteria C in Table 2 of Appendix 1 if the sediments are at or above a two-foot scour depth with an added factor of safety to be determined during remedial design.

The bankfull channel shall be constructed according to appropriate design considerations. Exact removal depth and width, reconstruction width, design specifics, and channel materials shall be determined during the design phase, subject to EPA approval, in consultation with DEQ. Flood elevations for the design flood shall be determined using an EPA, in consultation with DEQ, approved approach. The stream corridor shall be constructed from suitable clean materials and using native riparian vegetation. All replacement floodplain and in-stream materials shall meet the requirements as defined by Appendix 1, Table 2, as applicable for the location of the material being replaced. The realignment of SBC-Below the Confluence shall include establishing the channel with a geomorphically acceptable gradient.

The exact location and design details of the relocated channel and other details not identified in this work plan shall be determined during the design phase, subject to approval by EPA, in consultation with DEQ.

**6.1.4 Regrade and Construct Cap(s)**

Re-grading shall be conducted on the BRW Northern Cap or Removal Area shown in Figure BRW-1 outside of the removed wastes to produce a land



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

surface acceptable for future land uses. A cap shall be constructed over this area where waste is left in place, in accordance with Appendix 1, Table 3 that will ensure protectiveness of human health and surface water. No tailings, waste, contaminated soils, or slag shall be left in the newly constructed 100-year floodplain, except as set forth in this Remedial Element Scope of Work. Efforts shall be made to construct the cap(s) in a manner that will be acceptable to facilitate future land uses. The exact nature of the cap(s) shall be defined in the final design documents and could vary according to location and is subject to approval by EPA, in consultation with DEQ.

## **6.2 Institutional Control Considerations**

Through the planning and design process, certain institutional controls shall be identified and described in the remedial design plan. The implementation of any institutional control for this area shall be a cooperative effort among local government, state government, SDs, and other project stakeholders, and shall be the responsibility of the SDs. Potential institutional controls may include motorized and non-motorized travel restrictions, sensitive area exclusions, and future site development restrictions. Fencing or other access restrictions may also be identified.

Any existing institutional controls (including the CGWA) shall remain in effect, including throughout construction.

## **6.3 Further Information Needed**

As part of the remedial design, the SDs shall demonstrate that there is sufficient treatment capacity at the Butte Treatment Lagoons to incorporate expected groundwater flowrates and chemistry. To that end the SDs shall perform an analysis showing that there is adequate capacity and treatment capability to treat all expected BRW Smelter Area contaminated groundwater. If necessary, the SDs shall expand the treatment capacity of the Butte Treatment Lagoons to treat groundwater that is captured in the hydraulic control system in the BRW Smelter Area.

Data Gaps that Need to be Addressed Prior to Completion of the 30% design plan

- a) Lateral limits, thickness, and base of tailings, waste, contaminated soils, and slag in or adjacent to the removal areas.
- b) Estimates of total tailings, waste, contaminated soils, and slag volumes
- c) The nature and extent of the organic contamination within the BRW
- d) Groundwater elevations and potentiometric surface.
- e) Groundwater conductivity and transmissivity.
- f) Aquifer geometry.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- g) Seasonal groundwater change.
- h) Geotechnical considerations for constructability (e.g., excavation or other removal methods for poured slag and other debris).
- i) SBC-Below the Confluence bottom invert at the upstream and downstream tie in locations of the reconstructed stream.
- j) Evaluation of potential lining of relocated SBC-Below the Confluence channel: design considerations and examples of other sites with successful implementation.
- k) A plan to deal with organic contamination in soils and groundwater.

**6.4 Additional Project Requirements and Information to be Addressed in Remedial Design**

Site-specific data are required to refine the following:

1. **Engineering Design:** Detailed analysis and design of the contaminated materials removal and replacement with clean materials, including existing and post-remediation hydraulic modelling through the reach.
2. **Excavation and Disposal Analysis:** The total expected disposal quantities of tailings, waste, and contaminated soils shall be further investigated to select an appropriate repository location(s). Contingency excavation and disposal plans shall be developed during the project design phase for EPA approval, in consultation with DEQ.
3. **100-year Flow:** The 100-year flow rate for Silver Bow Creek below the confluence with Blacktail Creek through the remedial reach (to be constructed in the removal corridor) shall be calculated through appropriate Bulletin 17B statistical analysis of data available from the USGS stream gage site 12323240 (SS-04).
4. **100-year Base Flood Elevation<sup>2</sup>:** The 100-year flood elevation shall be determined based on the calculated 100-year flow via appropriate hydraulic modelling methods. All connected areas below this elevation shall be considered in the “100-year floodplain”. Additional survey information may be required to complete this modelling.

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<sup>2</sup> Note that the calculated 100-year flow and the resulting modeled 100-year base flood elevation may differ from the FEMA defined 100-year flow and associated floodplain. For the purposes of the remedial design, the calculated 100-year flow and modeled 100-year water level and flood width will be used, not the FEMA defined flows and floodplain.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

5. **Soil Replacement Materials:** All replacement floodplain and in-stream materials shall meet Criteria A and Criteria C in Appendix 1, Table 2.
6. **Repository Location and Transport Route:** All removed materials shall be safely transported to a repository approved by EPA in consultation with DEQ.
7. **Soft Armoring:** Design of a soft armor bank shall be completed based on hydraulic modelling results.
8. **Vegetative Materials:** Appropriate native vegetative materials shall be determined to suit the area being planted, including considerations of upland, riparian, wetland, and sub-irrigated locations.
9. **Construction Planning and Evaluation:** More detailed evaluation of the quantity, requirements, dewaterability, and geotechnical properties of the material to be removed shall be necessary prior to a completed design and implementation.
10. **Geotechnical Conditions:** Geotechnical investigation may be required to adequately characterize subsurface conditions in areas near bridges and culverts, railroad embankments, and/or other structural features.
11. **Achievement of RAOs:** Construction of the prescribed remedy is expected to contribute to achievement of RAOs. The total contribution and effectiveness of the BRW Project remedial actions may not be fully quantifiable until all remedial activities associated with surface water have been constructed and optimized.
12. **Site Programming and Master Plan:** To facilitate coordination between remedial activities and land use development, it is necessary for project stakeholders to engage in discussions regarding final site conditions and intended end land use objectives. Project benefits may be obtained by all stakeholders and within all phases of the work through comprehensive site planning.
13. **Other Waste Materials:** In addition, the potential for presence of other types of contamination (e.g., landfill, RCRA, organic, etc.) in soils at BRW area may impact the disposal of the material. This issue shall be addressed in the 30% BRW Smelter Area Remedial Design Report.
14. **Other:** Data gaps that may be identified during the design phase.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **7.0 INSUFFICIENTLY RECLAIMED SOURCE AREAS**

The sites presented in Table 1 and on Figure IR-1 are located within the Butte Priority Soils Operable Unit (BPSOU) and have been previously reclaimed. These sites were reclaimed prior to establishment of the Butte Hill Revegetation Specifications (BHRS) (EPA 1997). Additional reclamation work may be required to bring them into compliance with the BHRS. The SDs shall carry out the activities required to implement this element of the RD/RA Scope of Work. The requirements of this remedial activity are:

1. *Site Evaluations* – Evaluate the sites presented in Table 1 to determine the appropriate reclamation plan for meeting the criteria of the BHRS.
2. *Remedial Action Work Plans* – For all sites listed in Table 1, prepare remedial action work plans (RAWP) describing the reclamation work which shall be performed.
3. *Site Reclamation* – For all sites listed in Table 1, perform additional reclamation to meet the criteria in the BHRS.

### **7.1 Site Evaluations**

Sites presented in Table 1 shall be evaluated individually by the SDs to assess past actions and to identify any site-specific conditions that fail to comply with the BHRS. The initial evaluation may include review of previous BRES field evaluations, onsite evaluations, and construction completion reports. The evaluation may require additional sampling to determine if the presence of COCs, insufficient growth media, or previously unidentified sources contribute to site deficiencies. Evaluations shall be reviewed by personnel with appropriate vegetation expertise (for example, personnel within the Montana Tech Restoration Program or SD experts) prior to submittal.

If additional data collection is necessary, a site-specific Quality Assurance Project Plan (QAPP) shall be developed. The QAPP shall require sampling at depth for COCs. All QAPPs shall be submitted to EPA and DEQ for review and approval by EPA in consultation with DEQ. After the evaluations and data collection activities have been completed, a summary report shall be submitted to EPA and DEQ for review and approval by EPA in consultation with DEQ. The summary report shall include the following:

- All site data (historic and new data).
- A declaration as to what BHRS standards and criteria are not met.

### **7.2 Remedial Action Work Plans**

After the evaluation and sampling (if needed) is completed, and a summary report is issued and approved, a site-specific RAWP shall be generated by the SD. The



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

RAWPs may include various strategies for improving reclamation performance and achieving BHRS standards, and may also include use of curb and gutter or other stormwater controls where appropriate to manage stormwater and protect reclaimed surfaces. The RAWPs shall define the appropriate corrective actions required to bring the site into compliance with the BHRS. The corrective measures included in the RAWPs may be applied across the entire site or locally. The RAWPs shall be submitted for review and approval by EPA, in consultation with DEQ. Upon approval of the RAWPs by EPA, in consultation with DEQ, the RAWPs shall be implemented by the SDs. All RAWPs shall contain a schedule for implementation.

### 7.3 Site Reclamation

Reclamation of a site(s) shall be performed in accordance with the approved RAWP, and may include, but not limited to, soil import, revegetation, capping and/or implementation of storm water controls, including the addition of curb and gutter construction, at or near the site. After implementation of the RAWPs, a construction completion report for each site shall be submitted for review and approval by EPA, in consultation with DEQ. Following reclamation, each site shall be integrated within and be evaluated according to the BRES program.

***Table 1. Sites for Evaluation***

Ref No.	Site Name	BRES No	Year Reclaimed	Acreage	Description of Previous Actions
1	Belle of Butte	8	1987	0.35	Recontoured above the shaft, capped and revegetated.
2	Clark St. Dump	9	1985	0.34	Constructed storm water control ditches, recontoured, capped and revegetated.
3	Magna Carta Lessee Dump	11	1998	10.69	Waste removed, constructed storm water control ditches, recontoured, capped and revegetated.
4	Curry	16	1991	0.17	Waste removal, regraded, capped, and revegetated.
5	Lexington Dump	29	1988	5.67	Regraded, applied lime rock, capped and revegetated.
6	Atlantic 1	30	1991	6.5	Recontoured, recapped, revegetated.
7	Corra 2 Dump	32	1991	2	Regraded, applied lime rock, capped and revegetated.
8	Eveline	34	1991	1.6	Waste removal, regraded, capped, and revegetated.
9	Laplatta Gulch	36	1988	12.24	Waste removal, regraded, capped, and revegetated.
10	Missoula Mine	46	1994	7.85	Regraded and seeded.
11	Zella	50	1991	0.05	Waste removal, regraded, capped, and revegetated.
12	Poulin	53	1985	3.39	Graded, capped and revegetated.
13	Soudan Dump	93	1995	0.24	Parking lot development. Recontoured, installed a retaining wall, covered, and revegetated.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

Ref No.	Site Name	BRES No	Year Reclaimed	Acreage	Description of Previous Actions
14	Washoe Dump	96	1985; 1998	0.6	Waste removal, regraded, capped, and revegetated. 1998 a 4-foot walking trail was installed. More revegetation.
15	Colorado Dump	104	1986	3.1	Waste removed, recontoured, and revegetated.
16	Lizzie Shaft	105	1980-82	4.18	NA
17	Travona Dump	121	1991	8.31	Waste removal, regraded, capped, and revegetated.
18	Tension Dump	127	1990/91	2.87	Waste removed, recontoured, storm water control ditch installed, capped and revegetated.
19	Heaney Dump	129	1990/91	0.39	Waste removal, regraded, capped, and paved with asphalt.
20	Dexter Mill	133	1990/91	5.07	Waste removal, regraded, capped, and revegetated.
21	Star West Dump	134	1991	3.99	Recontoured, capped and revegetated.
22	Washoe Sampling Works	135	1991	2.11	Waste and debris removal, recontoured, closed shaft, capped and seeded.
23	Timber Butte Mill	156	1989	12.07	Waste removed, recontoured, storm water control ditch installed, capped and revegetated.
24	Waste Rock Dump	158	Unknown		No site summary
25	North Alice Culvert	177	Unknown	0.5	Recontoured, storm water control ditch installed, capped and revegetated.
26	Black Bird	1625	1998	1.36	Regraded, capped and revegetated.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## 8.0 UNRECLAIMED SOLID MEDIA SITES

The sites presented in Table 2 and on Figure UR-1 are located within the Butte Priority Soils Operable Unit (BPSOU) and have potentially been impacted by historic mining and therefore may require capping and reclamation. These sites may pose a threat to human health, contribute metals-impacted sediments to existing or planned wet weather control features, or contribute to the degradation of surface water quality.

These sites shall be evaluated to determine whether capping and reclamation is required at each site by the SDs. The SDs shall carry out the activities required to implement this element of the RD/RA Scope of Work. The requirements of this remedial activity are:

1. *Site Evaluations* – Evaluate unreclaimed sites to determine if reclamation is necessary.
2. *Remedial Action Work Plans* – As necessary, prepare remedial action work plans describing the reclamation work to be performed.
3. *Site Reclamation* – Reclaim sites that exceed human health action levels, contribute historic mine waste including contaminated sediments to existing or planned wet weather control features, or contribute to the degradation of surface water quality.

### 8.1 Site Evaluations

Sites presented in Table 2 shall be evaluated individually by the SDs. If additional data collection is necessary, a site-specific Quality Assurance Project Plan (QAPP) shall be developed. The QAPP shall specify sampling at depth requirements for COCs. All QAPPs shall be submitted for review and approval by EPA, in consultation with DEQ, prior to sampling. After data collection activities have been completed, each site will be evaluated according to the logic described in the Solid Media Program Plan, and a summary report shall be submitted for review and approval by EPA, in consultation with DEQ. The summary report shall include all of the following:

- A summary of all site data (historic and new data);
- A declaration as to whether the site is at or above human health action levels or the Waste Identification Criteria in Table 1 in Appendix 1, whichever is more stringent;
- A declaration as to whether the site is contributing metals-impacted sediment to existing or planned wet weather control features; and
- A declaration as to whether historic mine waste at the site is contributing to the degradation of surface water quality.

Unreclaimed sites within BPSOU which are not listed in Table 2, but that are identified in the future as needing further evaluation and/or reclamation, shall be



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

evaluated and addressed as part of the Solid Media Management Program Plan. Sites listed in Table 2, which are determined by EPA, in consultation with DEQ, to not require site reclamation at this time, pursuant to this section, will be reviewed every 5 years as part of the five-year review report.

## 8.2 Remedial Action Work Plans

After the evaluation and sampling (if needed) is completed, and a summary report is issued and approved, a determination will be made by EPA, in consultation with DEQ, whether that the evaluated site requires reclamation as determined by the criteria described above. If reclamation is required, a Remedial Action Work Plan (RAWP) shall be generated and submitted for review and approval by EPA, in consultation with DEQ. The RAWP shall define the appropriate actions required to remediate the site, and shall meet the requirements of the Butte Hill Revegetation Specifications. All RAWPs shall contain a schedule for implementation.

## 8.3 Site Reclamation

Reclamation and other construction activities at a site shall be performed in accordance with the approved RAWP, and may include, but are not limited to, soil import, revegetation, capping and/or implementation of storm water controls, including the addition of curb and gutter construction, at or near the unreclaimed site. Following reclamation, each site shall be integrated within and be evaluated according to the BRES program. Following reclamation and other construction activities, a construction completion report for each site shall be submitted to EPA and DEQ for review and approval by EPA in consultation with DEQ.

***Table 2. Sites for Evaluation.***

Ref No.	Site Name	Description
UR-1	Between Ryan Rd. and Alice St.	Apparent mine waste located near the Mini Irvine (Source Area No. 2).
UR-2	East of Scrap H Point Rd. near Moose Dump.	Apparent mine waste located in the surrounding areas of Moose Dump (Source Area No. 12).
UR-3	South of Dewey Point Rd. and Rising Star	Apparent mine waste located near the Surprise Dump (Source Area No. 14).
UR-4	Northwest corner of Center St. and Idaho St.	Apparent mine waste.
UR-5	Northwest corner of N Montana St. and Ruby St.	Apparent mine waste located in the surrounding areas of Moscow Dump (Source Area No. 52).
UR-6	Northwest corner of E Granite St. and Arizona St. - Capri Motel parking lot	Apparent mine waste located in the parking lot of the Capri Motel of (Source Area No. 100).



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

<b>Ref No.</b>	<b>Site Name</b>	<b>Description</b>
UR-7	Southwest corner of E Granite St. and Covert St.	Apparent mine waste located near the Blue Jay (Source Area No. 101).
UR-8	Southwest corner of Madison St. and S Warren St.	Apparent mine waste located near the Anderson Shaft (Source Area No. 117).
UR-9	West of S Excelsior Ave. North of I-15	Apparent mine waste located near the Bonanza Dump (Source Area No. 120).
UR-10	East end of E. Iron St.	Apparent mine waste located near the Otisco Dump (Source Area No. 123).
UR-11	Northwest corner of Atlantic St. and E. 2nd St.	Apparent mine waste located near the Child Harold (Source Area No. 125).
UR-12	West end of Munich St. and South of I-15	Apparent mine waste located near the Un-Named Dump (Source Area No. 148).
UR-13	North of I-15 and west of Colorado Smelter North	Apparent mine waste located west of the Colorado Smelter North (Source Area No. 150N). May require removal.
UR-14	East of Copper Mountain Complex	Apparent mine waste located in the surrounding areas of Clark Tailings East (Source Area No. 155E).
UR-15	South of Ryan Rd and West of 4th St.	Apparent mine waste located near the Gold Smith Dumps (Source Area No. 161).
UR-16	Jefferson St and S Warren Ave.	Apparent mine waste located near the Garden Street (Source Area No. 173).
UR-17	Surrounding Areas of Upper Missoula Gulch	Apparent mine waste located in the surrounding areas of Upper Missoula Gulch (Source Area No. 175).
UR-18	Southwest corner of Hornet St. and Alabama St.	Apparent mine waste located near the Hornet Addition (Source Area No. 1503).
UR-19	RARUS railroad from Montana Street to S Arizona St.	Site identified by BSB as areas for evaluation.
UR-20	Park and Covert Streets (NW Corner)	Site identified by BSB as areas for evaluation.
UR-21	East Galena St. (300 Block)	Site identified by BSB as areas for evaluation.
UR-22	N. Arizona and E. Granite St. (NE Corner)	Site identified by BSB as areas for evaluation.
UR-23	New and Mahoney St. – Remaining areas	Storm water site identified in ROD; Portion reclaimed under UAO. A work plan for this effort has been approved by the agencies.
UR-24	Clark Mill and adjacent mill tailings	Site identified by BSB as areas for evaluation.
UR-25	Scrap H Point Rd. – South Ryan Rd. embankment	Site identified by BSB as areas for evaluation.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

<b>Ref No.</b>	<b>Site Name</b>	<b>Description</b>
UR-26	Grove Creek from Hanson to Rowe Rd.	Site identified by BSB as areas for evaluation.
UR-27	W. Copper and N. Washington St. (400 Block)	Site identified by BSB as areas for evaluation.
UR-28	Waukesha St. (800 Block)	Site identified by BSB as areas for evaluation.
UR-29	Greens Apts. – Surrounding areas	Site identified by BSB as areas for evaluation.
UR-30	N. Henry Ave. and West Zarelda St. – SW Corner	Site identified by BSB as areas for evaluation.
UR-31	Big Butte VFD – Surrounding areas	Site identified by BSB as areas for evaluation.
UR-32	S. Colorado St. and W. Mercury St. – SE Corner	Site identified by BSB as areas for evaluation.
UR-33	I-15 and Excelsior St.	Site identified by BSB as areas for evaluation.
UR-34	Desperation Air Shaft – east of site	Site identified by BSB as areas for evaluation.
UR-35	Steward Parking Lot – South of site	Site identified by BSB as areas for evaluation.
UR-36	South Parrott Slope – unreclaimed areas	Site identified by BSB as areas for evaluation.
UR-37	Main St. and Mullen St. – NE Corner	Site identified by BSB as areas for evaluation.
UR-38	Isele	Site requested to be added by NRD.
UR-39	Belle of Butte – Surrounding areas	Site requested to be added by BSB.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## 9.0 UNCONTROLLED SURFACE FLOW AREAS BMPS

The areas shown on Figure USFA-1 as “Uncaptured Surface Flow” are located within, or drain to, the Butte Priority Soils Operable Unit (BPSOU) and have potentially been impacted by historic mining and may contribute to the degradation of surface water quality. Therefore, these areas may require installation of best management practices (BMPs) to reduce loading of contaminated sediments to Blacktail Creek and Silver Bow Creek below the confluence with Blacktail Creek.

The SDs, shall carry out the activities required to implement this element of the RD/RA Scope of Work. The requirements of this remedial activity are:

1. *Site Evaluations* – The uncaptured surface flow areas, as shown in Figure USFA-1, shall be evaluated to determine the areas contributing to degradation of surface water quality and determine whether BMPs are required to be installed by the SDs.
2. *Remedial Action Work Plans* – Prepare remedial action work plans describing the BMPs to be constructed.
3. *Remedial Action* – Construct and install BMPs appropriate for reducing contaminant loading to the creeks.

### 9.1 Site Evaluations

Uncaptured surface areas draining to Blacktail Creek and Silver Bow Creek below the confluence with Blacktail Creek (Figure USFA-1) shall be evaluated by the SDs to determine if individual sub-watershed areas contribute to the degradation of surface water quality. If additional data collection is necessary, a site-specific Quality Assurance Project Plan (QAPP) shall be developed for review and approval by EPA, in consultation with DEQ, prior to sampling. After the evaluations and data collection activities have been completed, a summary report shall be submitted for review and approval by EPA, in consultation with DEQ. The summary report shall include the following:

- A summary of all site data (historic and new data).
- A declaration of whether the individual sub-watershed areas are contributing contaminants of concern and impacting Blacktail Creek or Silver Bow Creek below the confluence with Blacktail Creek water quality.

No new BMPs are required within the Montana Street stormwater drainage area or outfalls/ runoff from I-90 to surface water. These structures collect storm water from urban sources and not from a Historic Mine Waste Source. Notwithstanding the prior sentence, the existing Montana Street HDD shall be maintained by the SDs, and SDs will investigate, propose and implement low impact BMPs to address



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

unpaved areas within the Montana Street stormwater drainage to address unpaved areas that direct stormwater runoff to surface water.

**9.2 Remedial Action Work Plans**

After the necessary evaluation and sampling are completed, and a summary report is issued and approved, EPA, in consultation with DEQ, will determine which sites require BMPs. If BMPs are required, a Remedial Action Work Plan (RAWP) shall be generated by the SDs and submitted for review and approval by EPA, in consultation with DEQ. The RAWP shall define the appropriate BMPs to reduce, or prevent, contaminant loading to the creeks. BMPs sizing will not exceed the 6-month, 24-hour Type I storm volume, determined with a hydrologic model approved by EPA, in consultation with DEQ.

**9.3 Remedial Action**

Remedial action activities shall be performed in accordance with the approved RAWP. An operations and maintenance plan shall be developed as part of the RAWP. Following remedial action, each BMP shall be integrated into a stormwater O&M program, with maintenance requirements and schedules dictated by the type of BMP installed. A construction completion report for the BMPs shall be submitted for review and approval by EPA, in consultation with DEQ.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**10.0 END LAND USE ADDITIONS – ADDENDUM 1**

The attached Addendum 1 presents end land use additions that will be constructed and implemented voluntarily in coordination with the remedy described in the Further Remedial Elements Scope of Work.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**11.0 REFERENCES**

BSBC, 2011. Municipal Storm Water Engineering Standards. 2011. Prepared by MMI and WET Technologies, PC. March.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**Appendix 1**



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

Table 1: Waste Identification Criteria

(Source SSTOU)

If three of the six contaminant criteria listed are exceeded or any one contaminant is above 5,000 mg/kg then, the material is considered tailings, waste, or contaminated soil.

Arsenic	200 mg/kg
Cadmium	20 mg/kg
Copper	1,000 mg/kg
Lead	1,000 mg/kg
Mercury	10 mg/kg
Zinc	1,000 mg/kg
Any single analyte above 5,000 mg/kg	

---

From Field Screen Criteria and Procedures Phase 7 and 8 Remedial Action, SSTOU Subareas 4, Reach R and S (Pioneer 2011). Four of six contaminants need to be below the criteria for area to pass (see DEQ's "Field Screening Criteria and Procedures Remedial Action SSTOU Subarea 3, Reaches M, N, & O" (January 2013)



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

Table 2: Backfill Material Suitability Criteria

PARAMETER	CRITERIA A <sup>1</sup> RIPARIAN, WETLAND AND SUB-IRRIGATED GROWTH MEDIA	CRITERIA B <sup>2,3</sup> GENERAL FILL	CRITERIA C <sup>4</sup> IN-STREAM SEDIMENT REPLACEMENT MEDIA
Soil Texture			
USDA Texture	Not Sa, LoSa or Cl	Not clay soils	TBD during design phase
Sand	20-70%		
Silt	10-60%		
Clay	5-30%		
Coarse Fraction (%>2mm)	<35%, Maximum fragment size = 3 inches	<60%, Maximum fragment size = 18 inches	
pH	5.5 to 8.5 S.U.		
EC/Salinity	<4.0 mmho/cm	<6.0 mmho/cm	TBD during design phase
SAR	<12		
Soil Saturation Percentage	Between 25% and 85%		
Metals			
Arsenic	<30 mg/kg	<200 mg/kg	<30 mg/kg
Cadmium	<4 mg/kg	<20 mg/kg	<4 mg/kg
Copper	<100 mg/kg	<1,000 mg/kg	<100 mg/kg
Lead	<100 mg/kg	<1,000 mg/kg	<100 mg/kg
Mercury	<5 mg/kg	<10 mg/kg	<5 mg/kg
Zinc	<250 mg/kg	<1,000 mg/kg	<250 mg/kg
Nutrients			
Phosphorous (P)	P, K, and NO <sub>3</sub> , will be used to verify fertilizer rates	Not Applicable (NA)	NA
Potassium (K)			
Nitrate + Nitrite (NO <sub>3</sub> )			
Organic Matter	3% minimum organic matter on a dry weight basis in the upper 6 inches of cover soil		
Vegetation	Vegetation shall consist of native species appropriate to the riparian, wetland, or sub-irrigated setting to the extent practicable. Final revegetation shall be determined as part of remedial design activities.	Not for use in Engineered Caps. This material can only be placed >18 inches below ground surface for structural needs.	NA

1 - Criteria A, from the SSTOU soil suitability requirements, applies to all replacement soils in:

- a. All areas of BTC and BRW; and
- b. BG, GG, NST and DE materials for the stormwater basin inlet and outlet channels, vegetated swales and bypass areas, and above the stormwater liner systems.

2 - Criteria B applies to structural fill below DE and BG stormwater basins (including associated inlet and outlet structures), GG and NST sedimentation basins (including inlet and outlet structures as appropriate). Not for use in-stream or in floodplains.

3 - Inert solid wastes and construction debris includes only unpainted masonry brick, dirt, rock, and concrete, and shall meet metals criteria in Table 2. Concrete size shall not exceed 3 feet by 3 feet.

4 - Criteria C applies to all materials placed in Blacktail, Silver Bow Creek below the confluence with Blacktail Creek and Confluence Area channel and riparian areas including the Blacktail Creek wetlands.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

Table 3: Engineered Caps/Cover Systems Material Suitability Criteria

PARAMETER	CRITERIA D <sup>5</sup> RIPARIAN OR SUB-IRRIGATED ENGINEERED CAP/COVER SYSTEMS		CRITERIA E <sup>6</sup> UPLAND ENGINEERED CAP/COVER SYSTEMS	
	(0 to 6-inches)	(6 to 18 inches)	(0 to 6-inches)	(6 to 18 inches)
Soil Texture				
USDA Texture	Not Sa, LoSa or Cl	Cover soil shall be a friable material and the <2.0 mm fraction characterized as loam, sandy loam, sandy clay loam, sandy clay, clay loam, silty clay, silty clay loam, silt loam, or silt in accordance with the USDA Soil Conservation Service textural classification.		
Sand	20-70%			
Silt	10-60%			
Clay	5-30%			
Coarse Fraction (%>2mm)	<35%, Maximum fragment size = 3 inches	<45%, Maximum fragment size = 6 inches	<45%, Maximum fragment size = 3 inches	<45%, Maximum fragment size = 6 inches
pH	5.5 to 8.5 S.U.			
EC/Salinity	<4.0 mmho/cm			
SAR	<12			
Soil Saturation Percentage	Between 25% and 85%			
Metals				
Arsenic	<30 mg/kg		<97 mg/kg	
Cadmium	<4 mg/kg		<4 mg/kg	
Copper	<100 mg/kg		<250 mg/kg	
Lead	<100 mg/kg		<100 mg/kg	
Mercury	<5 mg/kg		<5 mg/kg	
Zinc	<250 mg/kg		<250 mg/kg	
Nutrients				
Phosphorous (P)	P, K, and NO <sub>3</sub> , will be used to verify fertilizer rates	Not applicable	P, K, and NO <sub>3</sub> , will be used to verify fertilizer rates	Not applicable
Potassium (K)				
Nitrate + Nitrite (NO <sub>3</sub> )				
Organic Matter	3% minimum organic matter on a dry weight basis in the upper 6 inches of cover soil		3% minimum organic matter on a dry weight basis in the upper 6 inches of cover soil	
Cap and Cover Thickness and Vegetation	Engineered Cap minimum depth is 18 inches. Vegetation shall consist of native species appropriate to the riparian setting to the extent practicable. Final revegetation and capillary break design (if necessary) shall be determined as part of remedial design activities.		Engineered Cap minimum depth is 18 inches. Vegetation shall consist of native species appropriate to the upland setting to the extent practicable. Final revegetation and capillary break design (if necessary) shall be determined as part of remedial design activities.	

<sup>5</sup> - Criteria D applies to Engineered Caps at NST, GG and BG set forth in the following figures: Figures NST-1, GG-1, and BG-1.

<sup>6</sup> - Criteria E applies to Engineered Caps in upland areas of DE and NST set forth in the following figures: Figures DE-1 and NST-1. Criteria E does not apply to any sub-irrigated, wetland or riparian areas of NST and DE set forth in the following figures: Figures NST-1 and DE-1.

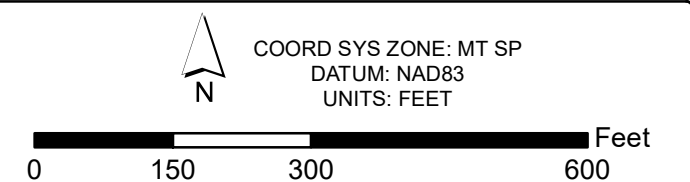




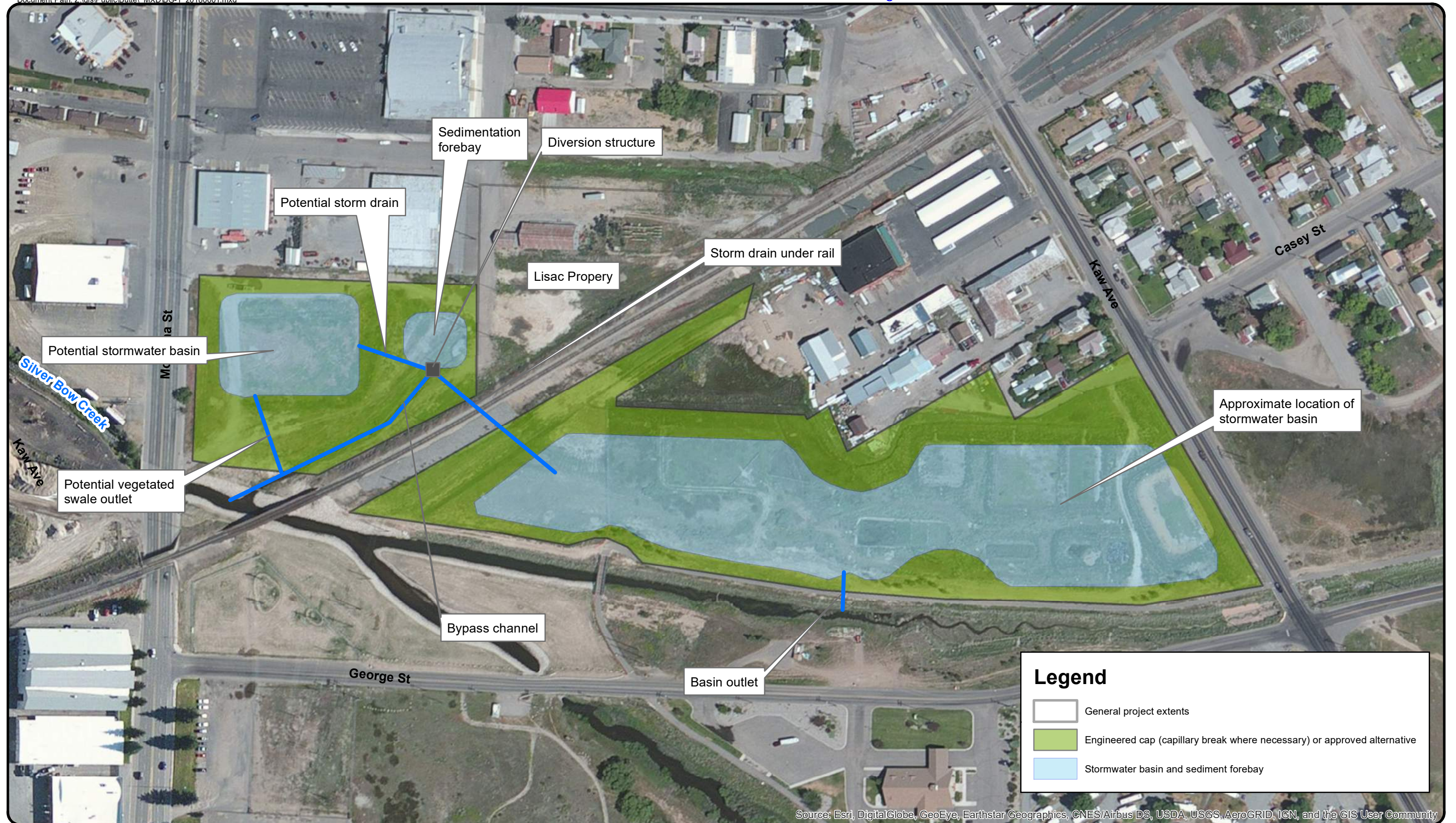
**Figure DE-1**  
**Digging East**  
**Remedial Action Plan**

**Conceptual**

Features, boundaries, and areas indicated are conceptual.



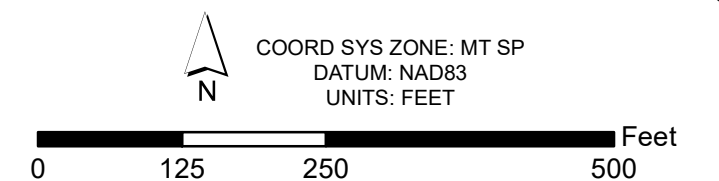




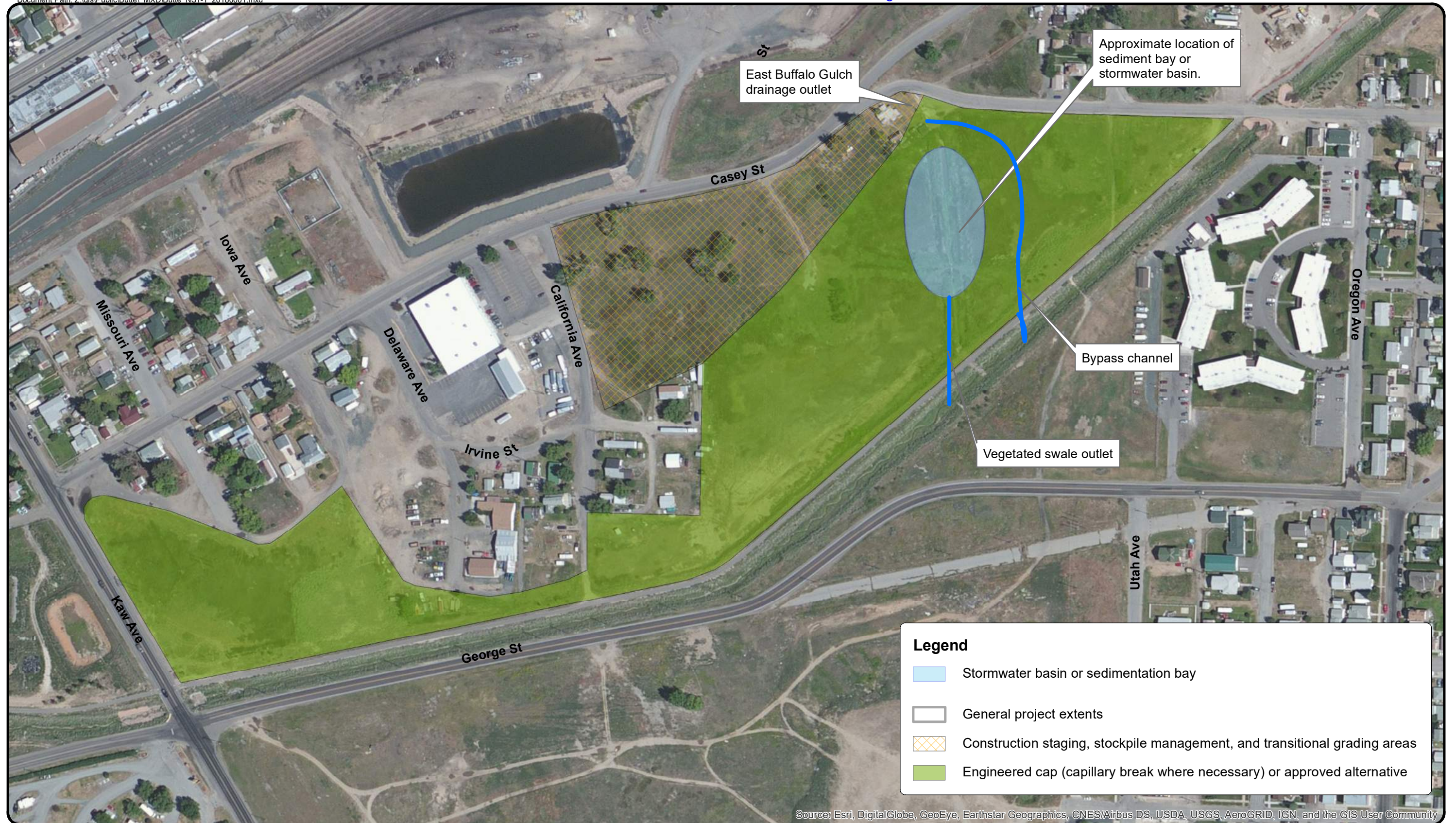
**Figure BG-1**  
**Buffalo Gulch**  
**Remedial Action Plan**

**Conceptual**

Features, boundaries, and areas indicated are conceptual.



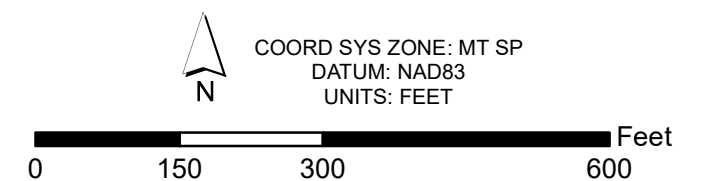




**Figure NST-1**  
**Northside Tailings**  
**Remedial Action Plan**

**Conceptual**

Features, boundaries, and areas indicated are conceptual.



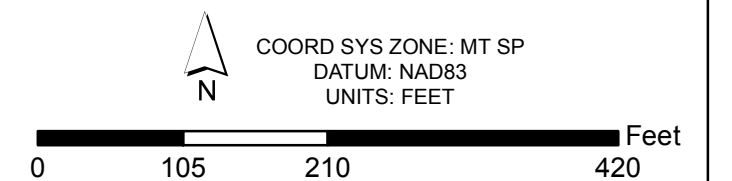




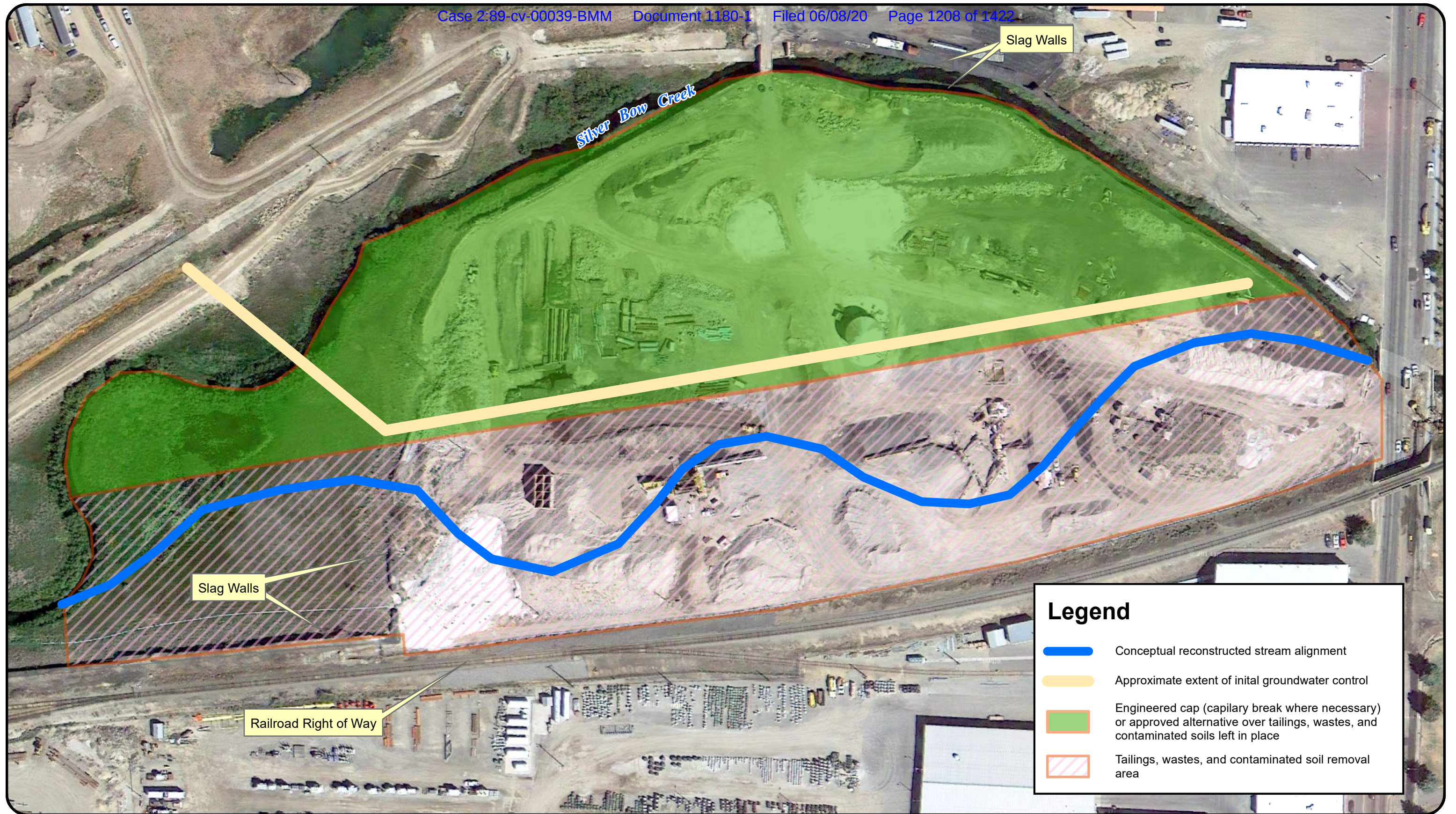
**Figure GG-1**  
**Grove Gulch**  
**Remedial Action Plan**

### Conceptual

Features, boundaries, and areas indicated are conceptual.







**Figure BRW-1**  
**Butte Reduction Works Smelter Area**  
**Remedial Action Plan**

**Conceptual**

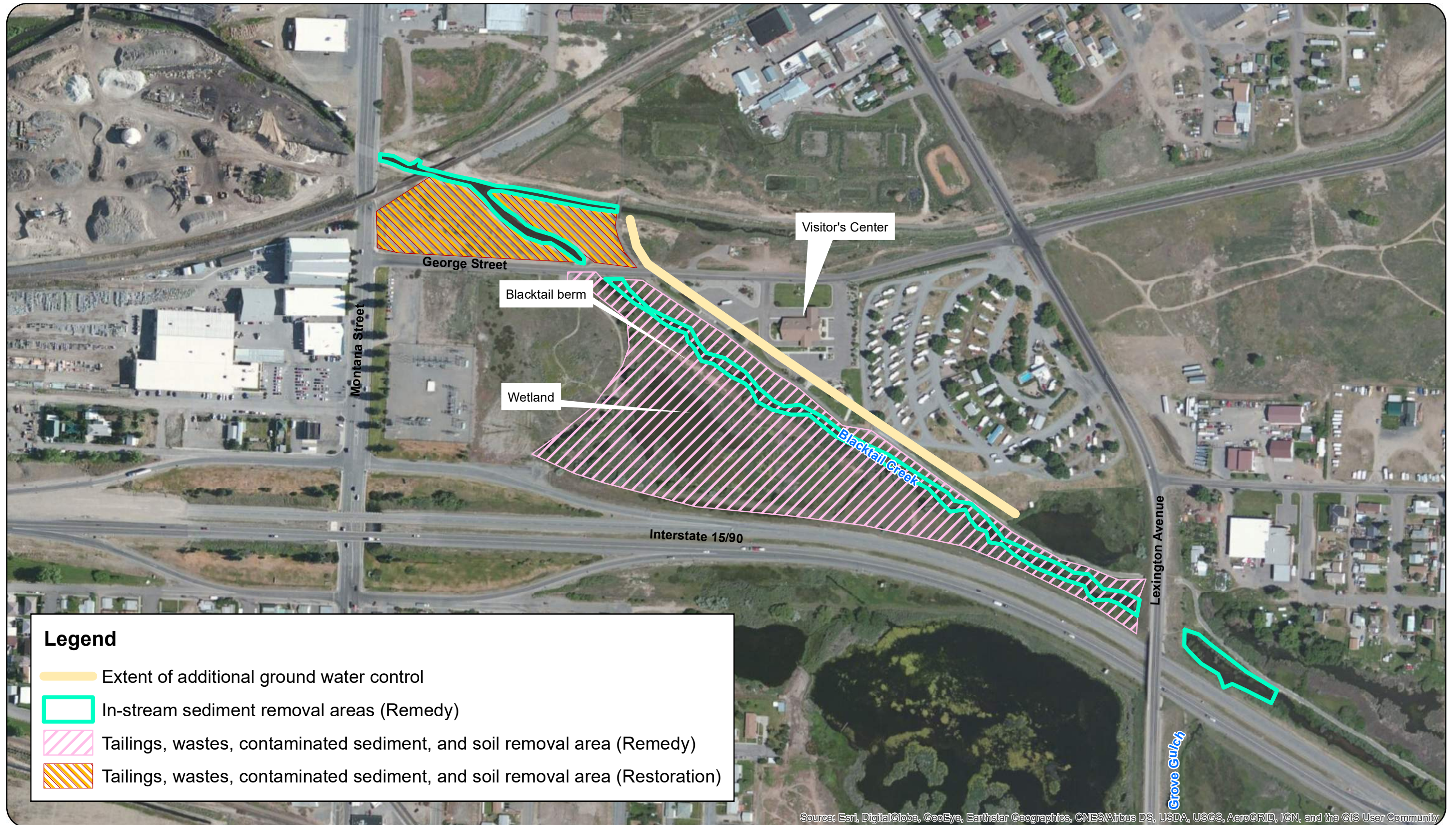
Features, boundaries, and areas indicated are conceptual.



COORD SYS ZONE: MT SP  
 DATUM: NAD83  
 UNITS: FEET

0 100 200 400 Feet





**Figure BTC-1**  
**Blacktail Creek**  
**Remedial Action Plan**

**Conceptual**

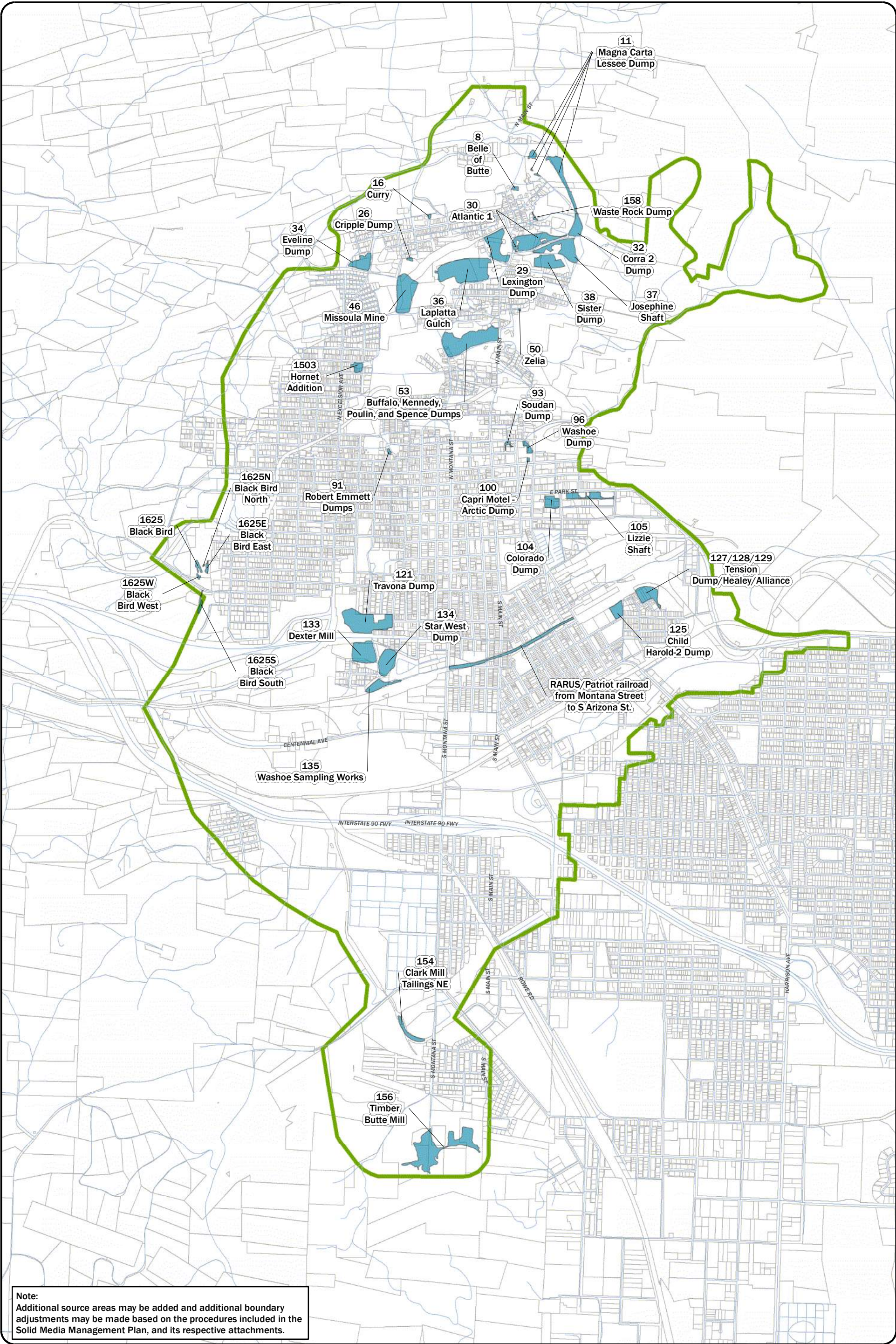
Features, boundaries, and areas indicated are conceptual.



COORD SYS ZONE: MT SP  
 DATUM: NAD83  
 UNITS: FEET

0 200 400 600 800 1,000 Feet





**LEGEND**

- INSUFFICIENTLY RECLAIMED SITES / BRES ID
- 2019 BPSOU ROD AMENDMENT ADJUSTED BOUNDARY

DISPLAYED AS:  
PROJECTION / ZONE: MSP  
DATUM: NAD 83  
UNITS: INT'L FT  
SOURCE: PIONEER / BSB

0 1,000 2,000 4,000  
Feet

**FIGURE 1R-1**

**INSUFFICIENTLY RECLAIMED SOURCE AREAS**

DATE: 10/02/2019



Path: P:\ARCO\GIS ARWWS-BPSOU\BPSOU LandSupport\CD Support\PotenSrcAreas UnRcl cd 002 19.mxd







**END LAND USE ADDITIONS**  
**for the**  
**BUTTE PRIORITY SOILS OPERABLE UNIT**  
**of the**  
**SILVER BOW CREEK / BUTTE AREA SUPERFUND**  
**SITE**  
**Butte-Silver Bow County, Montana**

ADDENDUM 1 TO ATTACHMENT C  
TO APPENDIX D  
TO THE CONSENT DECREE



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**TABLE OF CONTENTS**

<b>1.0</b>	<b>INTRODUCTION.....</b>	<b>1</b>
1.1	Recirculating Water Systems.....	1
1.1.1	Diggings East Primary Basin.....	1
1.1.2	Buffalo Gulch Primary Basin .....	2
1.2	SBC Channel Improvements .....	2
1.3	Fishing Pond .....	3
<b>2.0</b>	<b>STATE OF MONTANA END LAND USE ADDITIONS.....</b>	<b>4</b>
2.1	Parrot Tailings Waste Removal Project Area.....	4
2.2	Blacktail Creek Area.....	4
<b>3.0</b>	<b>POTENTIAL LINED CREEK IN SILVER BOW CREEK DRAINAGE</b>	
	<b>ABOVE THE CONFLUENCE .....</b>	<b>5</b>
3.1	Location of a Lined Creek .....	5
3.2	Funding for a Potential Lined Creek .....	6

**LIST OF FIGURES**

Figure 1	Silver Bow Creek Channel Improvements
Figure 2	Diggings East and Northside Tailings Reserved Area
Figure 3	Parrot Tailings Reserved Area



## 1.0 INTRODUCTION

End land use (ELU) additions will be constructed in coordination with remedy implementation. The ELU additions will be integrated adjacent to or within the geographic project areas as specified. The ELU additions will include:

1. *Recirculating Water Systems* – Construction of recirculating water systems designed to circulate one cubic foot of water per second (cfs) within the Diggings East and Buffalo Gulch primary stormwater basins, if construction and operation of such systems is consistent with achieving the primary objective for water treatment, as determined in Remedial Design.
2. *Silver Bow Creek (SBC) Channel Improvements* – Construction of landscape features and tree plantings at Silver Bow Creek above its confluence with Blacktail Creek in areas adjacent to and within the existing channel.<sup>1</sup>
3. *Fishing Pond* – A fishing pond, approximately 1-acre in size, constructed at the Northside Tailings site, if approved by the relevant regulatory agencies.
4. *Reserved Area* – A Reserved Area between Casey Street and Kaw Avenue is identified as a potential location for a lined creek. Any future development of the lined creek concept, should that occur, is not part of the Remedy, or the Work required under the terms of this Consent Decree.

### 1.1 Recirculating Water Systems

#### 1.1.1 Diggings East Primary Basin

Seasonal flow of approximately one cfs will be circulated within the Diggings East Primary Basin (DE Basin), if including this feature is determined to be compatible with design and operational requirements to meet water treatment objectives, as determined in Remedial Design. Supplemental water may be added periodically to make up evaporative and other losses and will be obtained from Butte-Silver Bow (BSB) municipal sources. Design and operational criteria for the DE Basin are described in Attachment C, Section 1. The cumulative volume of the retention pools and conveyance channel will be used to calculate the total basin volume. The recirculating water system will operate when

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<sup>1</sup> A State of Montana court decision known as *Silver Bow Creek Headwaters Coalition v. State of Montana*, DV-10-431 (August 17, 2015) declared that the surface area between Texas Avenue in Butte and the confluence of Blacktail and Silver Bow Creeks with Silver Bow Creek was named “Silver Bow Creek.” In prior Superfund removal and remedial documents and publications, including the 2006 Butte Priority Soils Operable Unit Record of Decision and 2011 BPSOU Explanation of Significant Differences, EPA has called this surface area the “Metro Storm Drain.” Due to The State of Montana’s involvement in this document’s issuance, and where reference to this specific section of Silver Bow Creek is necessary, further geographic descriptions, such as Silver Bow Creek “east” or “above” its confluence with Blacktail Creek are used in order for the State to comply with the court’s order. Reference to the area as “Silver Bow Creek” or “Silver Bow Creek above of its confluence with Blacktail Creek” should not be construed and is not an admission or determination by any Consent Decree Party on any procedural or substantive issue. The United States retains and reserves all its rights and authorities.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

seasonal conditions allow, in a manner that prevents damage to the system from freezing. Operation of the recirculating water system may be reduced or suspended during storm events when adequate flow (one cfs or greater) is present to naturally maintain flow through the pools and naturalized channel. The supplemental flow rate may be varied to maintain best management practice (BMP) treatment effectiveness, and recirculated water system operation will be suspended if such operations impede BMP treatment effectiveness.

### **1.1.2 Buffalo Gulch Primary Basin**

Seasonal flow of approximately one cfs will be circulated through the Buffalo Gulch Primary Basin (BG Basin), if including this feature is determined to be compatible with design and operational requirements to meet water treatment objectives, as determined in Remedial Design. Supplemental water may be added periodically to make up evaporative and other losses and will be obtained from BSB municipal sources. Design and operational criteria for the BG Basin are described in Attachment C, Section 2. The cumulative volume of the retention pools and conveyance channel will be used to calculate the total basin volume. The recirculating water system will operate when seasonal conditions allow, in a manner that prevents damage to the system from freezing. Operation of the recirculating water system may be reduced or suspended during storm events of adequate flow (one cfs or greater) that are able to naturally maintain flow through the pools and naturalized channel. The supplemental flow rate may be varied to maintain BMP treatment effectiveness, and recirculating water system operation will be suspended if such operations impede BMP treatment effectiveness.

## **1.2 SBC Channel Improvements**

In coordination with Remedy and future maintenance activities planned for the SBC channel and underlying Remedy infrastructure, aesthetic improvements within the SBC channel area will be made above its confluence with Blacktail Creek. These aesthetic improvements will occur through select reaches beginning at or near Texas Avenue to or near the confluence with Blacktail Creek as indicated on Figure 1 to this Addendum 1, Further Remedial Elements Scope of Work End Land Use Additions. Improvements will include planting of trees and shrubs within the channel easement (limited to an average of one tree per fifty feet); seeding of alternative grass species; and site-specific grading, benching, or other landscape improvements at discrete locations. Aesthetic improvements will include update or removal of grouted riprap aprons. Aesthetic improvements will be consistent with protecting and maintaining the effectiveness of the Remedy.

## **1.3 Fishing Pond**



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

A fishing pond will be constructed at the Northside Tailings/East Buffalo Gulch Area, if practicable and approved by the relevant regulatory agencies. The pond structure will be lined to prevent connection between pond water and groundwater, and to fully separate the lined pond from all other surface water features and prevent potential migration of fish into Silver Bow Creek or Blacktail Creek. The fishing pond will be built to an appropriate depth, and will provide adequate flow circulation, to sustain a seasonal stocked fishery. Once the pond structure is constructed, BSB will work with the appropriate state agencies to supply water and stock the pond with fish for use as a public fishing pond. Stocking and dedication of water rights to support use of the pond for fishing are not elements of the Remedy or the Work required under this Consent Decree.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **2.0 STATE OF MONTANA END LAND USE ADDITIONS**

### **2.1 Parrot Tailings Waste Removal Project Area**

The anticipated end land use for the Parrot Tailings Waste Removal Project area (Removal Project) is uncertain following Removal Project completion, and future redevelopment will be guided by Butte-Silver Bow County, the property owner, and in alignment with BSB planning and growth policy and approvals. The Removal Project site will be graded, revegetated and paved as outlined in the February 20, 2018 agreement between BSB and the State. Appropriate stormwater BMPs that are required by the February 20, 2018 agreement, MS4, state law and/or local ordinance will be constructed as part of the Removal Project. Any stormwater basins and other water features located in the Removal Project area, constructed either under the February 20, 2018 agreement (if any) or BSB County's future redevelopment of its property, shall be lined to minimize infiltration to groundwater.

### **2.2 Blacktail Creek Area**

To support the final end land use for the Blacktail Creek Area, fishing amenities will be constructed as part of the Remedy. Once the amenities are constructed, DEQ and BSB will work with the appropriate state agency to make the fishing amenities available to the public.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

### **3.0 POTENTIAL LINED CREEK IN SILVER BOW CREEK DRAINAGE ABOVE THE CONFLUENCE**

#### **3.1 Location of a Lined Creek**

A Reserved Area for the potential location of a lined creek within the Diggings East and Northside Tailings project areas is shown on Figure 2 to this Addendum 1, Further Remedial Elements Scope of Work, End Land Use Additions. Funding for and the design, construction and future operation and maintenance of any lined creek and related landscaping in the Reserved Area or other location within the SBC drainage above the confluence of Silver Bow Creek with Blacktail Creek are not elements of the Remedy and shall not be required as Work under this Consent Decree.

Within the Reserved Area, a lined creek could be constructed, if the engineering and other analyses prepared by a project proponent confirm that design and operation of such a feature is feasible. Among other requirements and constraints that may be identified at that time, the creek bed must be lined to avoid impacts to the then-operating Remedy systems and to separate the creek from connection to or interaction with groundwater. A lined creek also could potentially be located within the Parrot Tailings Waste Removal Project area, depending on BSB's objectives for end land use and future development of the BSB County-owned property. End land use must be in accordance with local planning and zoning regulations and the associated public process required. Figure 3 to this Addendum illustrates a Reserved Area where a lined creek could be located to the south of the Parrot Waste Removal Project area on BSB County-owned property.

Implementing the construction of a lined creek requires, among other things, resolving infrastructure issues in the area between the BSB County-owned property (near Texas Avenue) and the Reserved Area, and passage of a lined creek under Harrison Avenue in a manner that does not compromise the effective operation of the stormwater Remedy. A source of clean water and title to real property owned by third parties must also be secured.

The approval and agreement of the Consent Decree Parties to allow any lined creek in proximity to the Remedy is expressly required, as the Remedy elements utilize the SBC channel to control stormwater, as described in the BPSOU Statement of Work (BPSOU SOW) and implemented under this Consent Decree.

The constructed channel located at Silver Bow Creek above its confluence with Blacktail Creek is positioned above and adjacent to other Remedy components, including the Subdrain. The Subdrain and the effluent pipeline from the Horseshoe Bend Water Treatment Plant, constructed as part of the Butte Mine Flooding Operable Unit remedial action, were built concurrently within a BSB



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

utility right-of-way between Texas Avenue and the confluence of Silver Bow and Blacktail Creeks. In 2005, BSB County granted a permanent easement to Atlantic Richfield and others for the purpose of construction, operation and on-going repair, replacement and supplementation of such improvements.<sup>2</sup> The Easement Deed also confirms EPA's and DEQ's right of access for oversight of CERCLA-related purposes within the BSB utility right-of-way.

EPA, DEQ, BSB, and AR shall each have the opportunity to review and comment on the location, design, construction, operation, maintenance and landscaping for any lined creek or other water feature proposed to be located at Silver Bow Creek above its confluence with Blacktail Creek to protect the Remedy and to ensure that the lined creek is compatible with the Remedy. Location of a lined creek or other water feature must be in accord with all existing easements and/or other applicable authorities.<sup>3</sup> Subject to the foregoing conditions, EPA, DEQ, BSB and AR commit to work cooperatively with any project proponent during the review process to resolve the Consent Decree Parties' comments on or objections to any proposed project. The Consent Decree Parties' cooperation with a project proponent shall not require modification of the Remedy, as constructed, or contribution of funds to support any project, except as provided in the following section of this Addendum 1 (*Funding for a Potential Lined Creek*).

### **3.2 Funding for a Potential Lined Creek**

The State will determine an appropriate amount of funding that would be deposited to an interest-bearing account to support a portion of the future costs for feasibility assessment, design and/or construction of a lined creek at Silver Bow Creek above its confluence with Blacktail Creek. Such funds would be used as a match for other funds secured by the project proponent, if land, water, access, infrastructure and other issues are resolved at the time a proposed project is presented by the project proponent to the Consent Decree Parties for review and approval. The source of the funds would be a portion of the payment to the State from Atlantic Richfield under this Consent Decree, if such funds are not required for DEQ's implementation of the BTC Riparian Actions described in the BPSOU SOW and Appendix H under this Consent Decree.

Any person or entity that proposes to design, construct, operate and maintain any lined creek at Silver Bow Creek above its confluence with Blacktail Creek must perform all such activities in a manner that protects and does not damage the Remedy, its components, and the end land use amenities in place at that

---

<sup>2</sup> Easement Deed (HSB Pipeline and MSD Improvements Easement), from BSB County (Grantor) to Atlantic Richfield Company and Montana Resources (Grantees), dated June 10, 2005, recorded at Roll 275, Card 68.

<sup>3</sup> The Consent Decree Parties recognize that Montana Resources, as a Grantee under the Easement Deed, also must consent to any use that may interfere with its protected interests under the Easement Deed.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

time. The project proponent must demonstrate that financial resources are available and committed long-term to construct, operate, maintain and repair the proposed lined creek as part of the review process required to proceed with a proposed project.

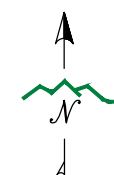
The Consent Decree Parties anticipate that the project proponent's commitments and obligations for a future lined creek project would be set forth in an enforceable agreement that provides for, among other things, oversight of project activities to support coordination with and protection of the Remedy.





**LEGEND**

AREA OF TARGETED GROUT REMOVAL



DISPLAYED AS:

COORD SYS/ZONE: MSP83

DATUM: NA

UNITS: IF

SOURCE: LDI

SCALE IN FEET

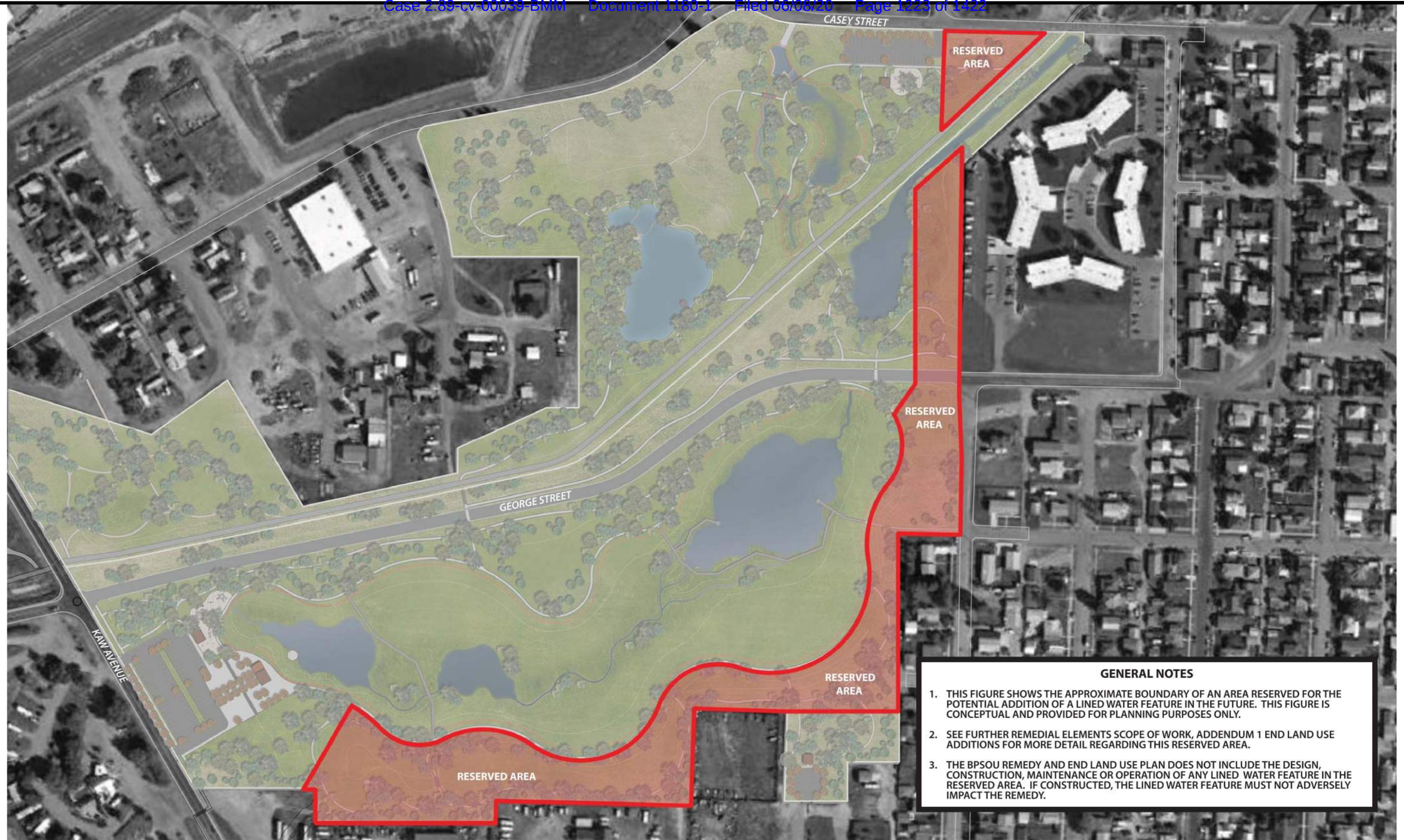
0 125 250

ADDENDUM 1 FIGURE 1

**SILVER BOW  
CREEK CHANNEL  
IMPROVEMENTS**

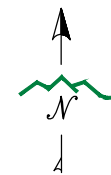
DATE: 10/29/2019





**LEGEND**

RESERVED AREA



DISPLAYED AS:  
 COORD SYS/ZONE: MSP83  
 DATUM: NA  
 UNITS: IF  
 SOURCE: LDI





SCALE IN FEET  
 0 125 250

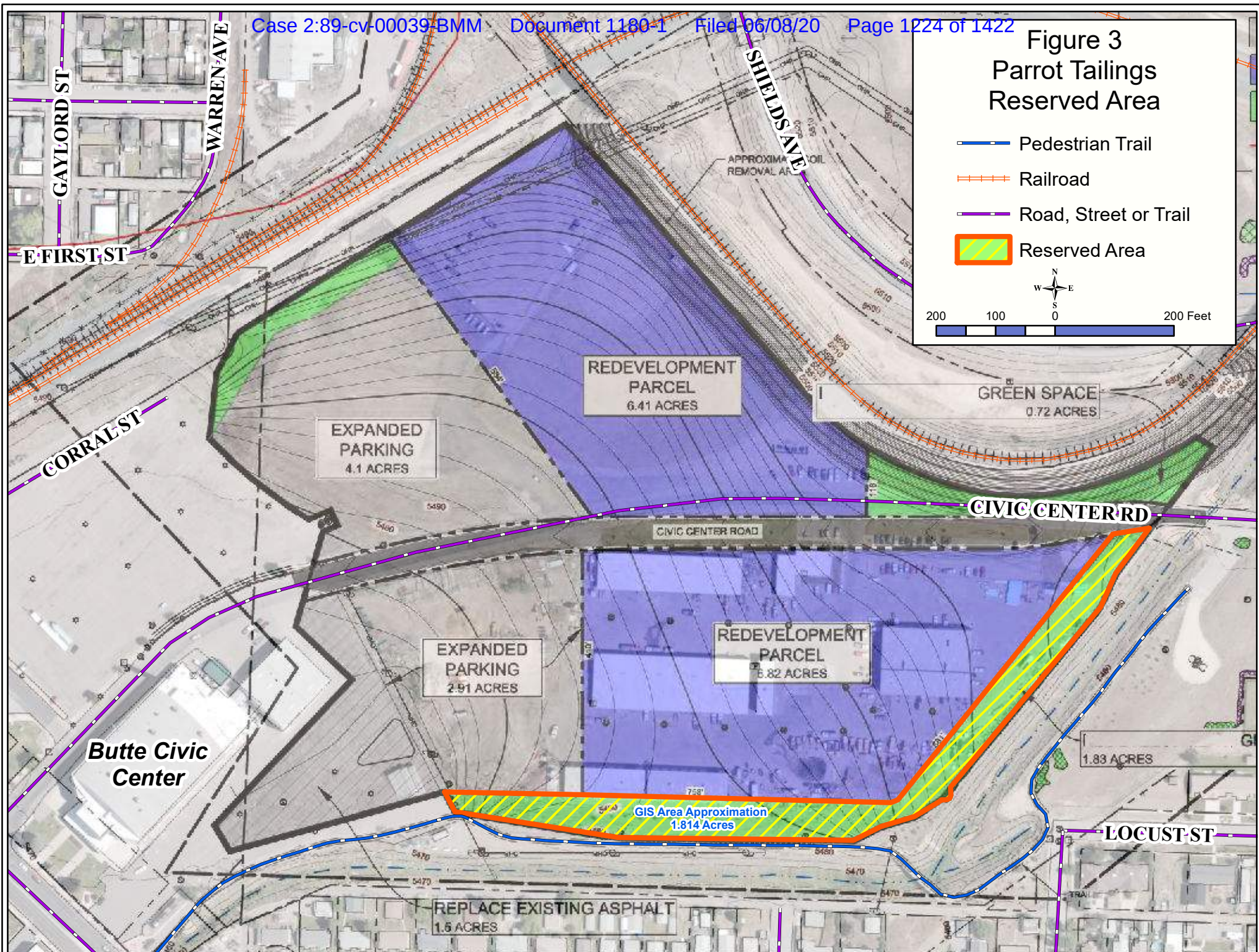
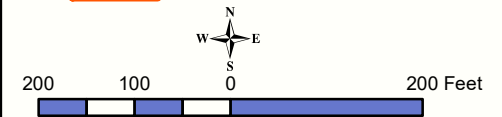
**ADDENDUM 1 FIGURE 2** DIGGINGS EAST  
 AND NORTHSIDE  
 TAILINGS  
 RESERVED AREA

DATE: 10/29/2019



**Figure 3**  
**Parrot Tailings**  
**Reserved Area**

-  Pedestrian Trail
-  Railroad
-  Road, Street or Trail
-  Reserved Area





**DESCRIPTION OF THE WET WEATHER REMEDIAL  
ELEMENT**

**BUTTE PRIORITY SOILS OPERABLE UNIT  
of the  
SILVER BOW CREEK / BUTTE AREA SUPERFUND  
SITE**

**Butte-Silver Bow County, Montana**

**ATTACHMENT D TO APPENDIX D  
TO THE CONSENT DECREE**



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

TABLE OF CONTENTS

1.0 INTRODUCTION.....1

2.0 SURFACE WATER MANAGEMENT FOR WET WEATHER REMEDIATION  
WET WEATHER CONTROL PLAN .....1

2.1 BMP Cycles Implemented Pre-Consent Decree .....2

2.2 Fourth and Final Cycle BMPs.....4

2.3 Performance Monitoring of BMPs and In-Stream Surface Water Performance  
Standards .....4

2.4 BMP Design Criteria and further ARAR waivers.....5



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **1.0 INTRODUCTION**

The Remedy for surface water is directed at achieving the primary objectives of returning Blacktail Creek (within BPSOU) and Silver Bow Creek downstream of its confluence with Blacktail Creek to beneficial uses, reducing the water quality impact of historic mine sources to achieve in-stream ARARs (as revised by the 2020 Record of Decision Amendment) during both normal flow and wet weather conditions, protecting in-stream sediments and protecting downstream receptors from releases of contamination that originate from historic mine sources in BPSOU. The Remedy for surface water includes a management plan for wet weather described in this Attachment D.

## **2.0 SURFACE WATER MANAGEMENT FOR WET WEATHER REMEDIATION – WET WEATHER CONTROL PLAN**

The Wet Weather Control Plan (WWCP) utilizes iterative Best Management Practices (BMPs) to address contaminated runoff from historic mine sources associated with storm and snow melt events (collectively wet weather events), and improve water quality. The 2006 ROD required these iterative BMPs to be implemented for a period of at least 10 years after the date of the ROD. Since issuance of the ROD in 2006 and prior to entry of the Consent Decree, three successive cycles of wet weather control BMPs have been constructed and implemented. Additional wet weather control BMPs were constructed prior to the ROD under various pre-ROD response actions, including the 1997 Stormwater Time Critical Removal Action (TCRA).

The three cycles of BMPs constructed post-ROD included a diverse range of BMPs to manage loading of heavy metals and arsenic from historic mine sources to Silver Bow Creek below its confluence with Blacktail Creek and Blacktail Creek during wet weather events. Monitoring data shows that progress has been made toward achieving compliance with the Performance Standards identified in Table 2-1 of the BPSOU Surface Water Compliance Determination Plan (SWCDP), attached to the BPSOU SOW as Attachment A.

The 2020 Record of Decision Amendment requires a final cycle of BMPs in place of the iterative BMP process described in the 2006 ROD. The future work described in the BPSOU SOW, the Further Remedial Elements Scope of Work (Attachment C) and this WWCP consists of the implementation of the fourth and final cycle of wet weather control BMPs. The fourth cycle of BMPs (described below) supplement and expand the network of BMPs in place for BPSOU that control and manage runoff, are remaining BMPs, and EPA, in consultation with DEQ, expect these BMPs will achieve the in-stream surface water ARAR performance standards described in Table 2-1 of the SWCDP, attached to the BPSOU SOW as Attachment A.

A compliance standard determination monitoring period (as further defined in the SWCDP, Attachment A to the BPSOU SOW), will start upon approval by EPA, in consultation with DEQ, of a Key Remedial Elements Construction Completion Report (KRECCR), as described in the SWCDP.

This KRECCR shall include data demonstrating adequate establishment of vegetation (that is, stable vegetative cover that is substantially in compliance with BRES standards, as well



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

as those pertinent reclamation ARARs) for all areas addressed by the key remaining remedial elements.

The data collected during this compliance standard determination monitoring period and previously collected monitoring data will be used to assess the effectiveness of the fourth and final cycle of BMP components and to evaluate for compliance with in-stream surface water ARAR performance standards by the integrated performance of all then-constructed BMPs and other remedial actions, as further described in the SWCDP.

## **2.1 BMP Cycles Implemented Pre-Consent Decree**

### **A. Pre-ROD BMPs**

Numerous BMPs were constructed prior to the ROD under various response actions including the 1997 Stormwater TCRA, as well as other TCRA throughout the Butte Hill. These BMPs included construction, operation and maintenance of stormwater control and conveyance structures, and detention ponds in critical areas on Butte Hill to minimize soil erosion and reduce the release and transport of contaminants of concern associated with historic mine sources into Blacktail Creek and Silver Bow Creek below its confluence with Blacktail Creek from its confluence with Blacktail Creek to points downstream. Other actions, which included wet weather BMPs as part of the actions, are:

- Walkerville TCRA (1988)
- Timber Butte TCRA (1989)
- Butte Priority Soils TCRA (1990-1991)
- Colorado Smelter TCRA (1992)
- Anselmo Mine Yard and Late Acquisition/Silver Hill TCRA (1992)
- Lower Area One Manganese Removal (1992)
- Walkerville II TCRA (1994)
- BPSOU ERA Residential Soils/Source Areas (1994)
- Stormwater TCRA (1995-Present)
  - Missoula Gulch – detention basins, channel improvements, erosion control
  - Alice Dump reclamation
  - Dexter Street reclamation
  - Diversion of stormwater to Berkeley Pit
- Old Butte Landfill/Clark Mill Tailings (1998)
- Lower Area One ERA (1998)



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- Railroad Beds TCRA (1999-2004)
- Walkerville TCRA (2000-2001)

**B. First, Second and Third Cycles of BMPs**

Three cycles of BMPs were implemented since issuance of the BPSOU ROD in 2006. Those actions are described below.

Between 2009 and 2012, the First Cycle and Second Cycle BMPs were implemented by the Respondents to mitigate contaminated storm water run-off within BPSOU. These collective actions included:

Reclamation and revegetation of several areas identified as contamination contributors to storm water run-off from historic mine sources;

The expansion and improvement of existing catch basins;

The implementation of a curb and gutter program on Butte Hill which addressed 5,754 feet;

1. Prioritized cleanout and/or repair of subsurface stormwater drain sections; and
2. Elimination of illicit sewer connections to the stormwater system.

Design and construction of a third cycle of BMPs was completed under the July 2011 Unilateral Administrative Order (UAO). The Third Cycle BMPs included:

Continuation and expansion of the curb and gutter program for the BPSOU to address an additional 7,500 feet;

1. Stormwater system operations, maintenance and replacement in the BPSOU (on-going);
2. Catch Basin #9 Improvements;
3. Catch Basin BG-01 and WL-12 were evaluated for feasibility and property was purchased for future remedy implementation. Final design and construction will be performed under the fourth cycle;
4. Additional Source Controls including soil caps, rip-rap lined ditches, drainage improvements, rock check dams, vegetated swales, and sediment traps constructed at twenty-two (22) sites, three (3) of which were on property owned or controlled by Group 2 SDs and implemented by Group 2 SDs;
5. The following Hydrodynamic Devices (HDs) which were installed and construction completed:
  - Texas Avenue
  - Anaconda Road;



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- Warren Avenue;
- Montana Street; and
- Buffalo Gulch.

6. Development and Implementation of the Storm Water Ordinance.

A Storm Water Ordinance has been developed and is being implemented by Butte Silver Bow County (BSBC). EPA and DEQ will cooperate and support BSBC's prompt enforcement against third parties for violations of the Storm Water Ordinance, including but not limited to failure to obtain or comply with permitting, use, maintenance, and other ordinance requirements.

**C. EPA Oversight of BSBC municipal activities**

EPA and DEQ recognize that agency oversight of BSBC's BMP actions on behalf of the Settling Defendants sometimes overlap with BSBC's normal municipal functions. EPA and DEQ will cooperate with BSBC in their oversight and approval of BSBC actions in the BPSOU, to ensure that duplicate reporting or inconsistent obligations are avoided to the extent practicable. EPA and DEQ's oversight of these BSBC municipal BMP actions is limited to review and concurrence/approval of storm water improvements and maintenance prioritization, schedules, design criteria and annual reporting as noted in the Street and Snow Management Operation and Maintenance Plan or the Stormwater Structures Operation and Maintenance Plan. Except as referenced above related to oversight and support of the Storm Water Ordinance as a public institutional control, EPA and DEQ oversight does not extend to oversight or approval of county budgets, personnel, or contractors.

**2.2 Fourth and Final Cycle BMPs**

Based upon evaluation of current conditions and the monitoring data, and a determination that these BMPs are technically practicable, the fourth and final cycle of BMPs described in Sections 1 through 4 and Section 9 of the Further Remedial Elements Scope of Work, Attachment C, shall be designed and implemented as described in the BPSOU SOW, Appendix D to the Consent Decree, and Attachment C to the BPSOU SOW.

**2.3 Performance Monitoring of BMPs and In-Stream Surface Water Performance Standards**

In-stream surface water monitoring, analysis, and annual program reporting shall be completed by the SDs as part of the WWCP from the effective date of the CD, as described in the SWCDP and the BPSOU Surface Water Management Plan (SWMP).

After the Key Remedial Elements are completed, including the establishment of vegetation, a compliance standard determination monitoring period (as further described in the SWCDP) will follow, which shall include surface water monitoring as described in the SWMP. A Compliance Standard Determination will be made as described in the SWCDP. The compliance standard determination monitoring period, which will provide data to support the Compliance Standard Determination, shall commence upon EPA approval, in consultation with DEQ, of the KRECCR. Monitoring and data reporting requirements are



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

described in the BPSOU SOW and Attachments A (the SWCDP and its attached SWMP) and B.1. of the BPSOU SOW.

**A. Surface Water Compliance Comparison and Interpretation Report**

Beginning on the Effective Date of the Consent Decree, the SDs shall submit to EPA and DEQ an annual data interpretation report, summarizing the surface water monitoring data and compliance surface water monitoring data, with AR as lead SD, addressing surface water data collected in the prior calendar year, by June 30 of each year through implementation of the Key Remedial Elements, approval of the KRECCR and through the compliance standard determination monitoring period. Subject to available funding, USGS monitoring and reporting of surface water data will continue under the Consent Decree for the Butte Mine Flooding Site (CV 02-35-BU-SEH) in accordance with the USGS protocols (including sampling 6 to 8 times per year) for normal flow conditions including base and normal high flows, at Stations SS-01, SS-04 and SS-07. Available USGS data and pertinent DEQ data shall be attached as appendices to this report. To the extent practicable, the report shall include correlation discussions between monitoring data and wet weather events. The description and content of the report is included in Section 7.3 of the SWMP. The report shall be submitted as a draft report, subject to agency review, comment and approval in accordance with Section 6 of the BPSOU SOW.

**B. Compliance Analysis**

Analysis of data to evaluate compliance determinations and compliance with in-stream surface water ARAR Performance Standards, and any other Performance Standards, shall be performed by EPA, in consultation with DEQ, in accordance with the provisions of the CD and the SWCDP.

**2.4 BMP Design Criteria and further ARAR waivers**

**A. BMP Design:**

All fourth cycle BMPs shall be constructed in accordance with the approved design plans as described in the BPSOU SOW. All BPSOU response actions relating to surface water remediation shall be operated and maintained in accordance with approved O and M plans.

**B. Periodic Review:**

As set forth in the SWCDP, compliance with each in-stream surface water ARAR Performance Standard, including any Replacement Standard, will be monitored under varying flow conditions for each COC after implementation of the fourth and final cycle BMPs, other Key Remedial Elements and approval of the KRECCR until the Compliance Standard Determination has been made, and continuing for Compliance Monitoring as further described in the SWCDP. EPA, in consultation with DEQ, will evaluate the performance of the WWCP, other surface water remediation elements, and integrated BMP actions. This evaluation shall be done as needed, but at least periodically as part of the five-year review processes required by the NCP for the BPSOU site. Annual wet weather compliance analyses will also be reviewed and compared against past data to identify trends and compared against relevant Performance Standards to assess the magnitude and materiality of exceedances related



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

to historic mine sources. Any such evaluation or analysis will be provided to the SDs by EPA upon completion of the evaluation or analysis.

Any failure to construct BPSOU response actions or to operate and maintain BPSOU response actions in accordance with the approved remedial design plans or applicable Operation and Maintenance plans shall be addressed by the SDs promptly and corrected in accordance with such plans. Except as provided in the Consent Decree, construction of all BMPs as part of the final remedy will be complete with construction of the Fourth Cycle BMPs described in the BPSOU SOW, as described above.

**C. Further Waivers and Penalties:**

In accordance with the SWCDP, if BMPs are not effective in achieving compliance with in-stream surface water ARAR Performance Standards, including any Replacement Standards adopted pursuant to the SWCDP, in Silver Bow Creek at the designated points of compliance following completion of the fourth and final cycle BMPs and other remedial elements, the compliance determination monitoring period, and EPA's Compliance Standard Determination, in consultation with DEQ, further performance standards waivers shall be considered, as follows.

Further Waiver:

In accordance with the SWCDP, following completion of the fourth and final cycle of BMPs described in Section 1.0 above and other Key Remedial Elements, the compliance determination monitoring period, and EPA's Compliance Standard Determination, the SDs may petition EPA and DEQ for a further technical impracticability waiver of any in-stream surface water ARAR Performance Standard including the waiver of any Replacement Standard, in accordance with CERCLA, the NCP, and EPA guidance in effect at the time of the petition ("Further Waiver"). Because all BMPs required under this BPSOU CD and BPSOU SOW will have been constructed at that time, EPA and DEQ will not require implementation of additional response actions beyond those that can be required by Paragraph 27 of the CD by the SDs to support any Further Waiver of a surface water Performance Standard then requested.

Such petition may include any biological monitoring data, sediment chemistry data and other information deemed relevant by SDs to consideration of the petition and requested waiver. The EPA and DEQ will review the application for Further Waiver, and EPA, in consultation with DEQ, may amend the existing BPSOU In-Stream Surface Water Technical Impracticability Report if the petition is granted. Any grant of the petition by EPA in consultation with DEQ for Further Waiver is subject to any requirements and processes for amending the ROD, including public participation requirements. Any determination by EPA to deny such Further Waiver petition is subject to dispute resolution pursuant to Section XV of the CD (Dispute Resolution).

The SDs will continue to monitor the surface water in accordance with the compliance monitoring elements of the SWCDP and the SWMP during the agencies' consideration of the petition. If a petition for Further Waiver is granted, the parties will negotiate in good faith to reach agreement for a modification of the SWMP to be consistent with a



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

ROD Modification required to support any further waiver of in-stream ARAR surface water Performance Standards.

Penalties:

No claim for stipulated or statutory penalties against the Settling Defendants for alleged noncompliance with any in-stream surface water Performance Standards including Replacement Standards shall arise under the Consent Decree.



**INSTITUTIONAL CONTROL IMPLEMENTATION AND  
ASSURANCE PLAN FOR THE BPSOU SITE**

**for the  
BUTTE PRIORITY SOILS OPERABLE UNIT  
of the  
SILVER BOW CREEK / BUTTE AREA SUPERFUND  
SITE  
Butte-Silver Bow County, Montana**

**APPENDIX E  
TO THE CONSENT DECREE**



---

**SILVER BOW CREEK/BUTTE AREA NPL SITE  
BUTTE PRIORITY SOILS OPERABLE UNIT**

---

***Final***

***Institutional Controls Implementation  
and Assurance Plan***

***Butte-Silver Bow County  
and  
Atlantic Richfield Company***

**October 2019**



---

# **SILVER BOW CREEK/BUTTE AREA NPL SITE BUTTE PRIORITY SOILS OPERABLE UNIT**

---

***Final***

## ***Institutional Controls Implementation and Assurance Plan***

Prepared for:

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And

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**October 2019**



**TABLE OF CONTENTS**

	<b><u>Page</u></b>
<b>1.0 INTRODUCTION.....</b>	<b>1</b>
1.1 ICIAP Overview .....	1
1.2 ICIAP Objectives .....	1
1.3 Role and Scope of ICs.....	1
<b>2.0 BACKGROUND .....</b>	<b>2</b>
2.1 BPSOU Location .....	2
2.2 Historic Use .....	2
2.3 Selected Remedies/Completed Response Actions .....	3
2.4 Land Use .....	4
<b>3.0 SELECTED BPSOU AND BUTTE SITE ICS .....</b>	<b>4</b>
3.1 Governmental Controls .....	4
3.1.1 Growth Policy/Zoning Ordinance.....	5
3.1.2 Controlled Groundwater Area.....	5
3.1.3 Hook-up Ordinance.....	6
3.1.4 Excavation Ordinance.....	7
3.1.5 Stormwater Management Ordinance .....	7
3.1.6 Access Controls .....	8
3.2 Proprietary Controls.....	8
3.2.1 General.....	9
3.2.2 Access Easements .....	10
3.2.3 Private Covenants .....	13
3.2.4 Status Summary .....	20
3.3 Informational Devices.....	21
3.3.1 Notice of Settling Defendants' Real Property Ownership in BPSOU .....	21
3.3.2 Community Protective Measures Program .....	21
3.3.3 Geographic Information System .....	22
<b>4.0 MONITORING .....</b>	<b>23</b>
4.1 Governmental Controls .....	23
4.2 Proprietary Controls.....	24
4.3 Informational Devices.....	24
<b>5.0 MODIFICATION/TERMINATION.....</b>	<b>24</b>
5.1 Governmental Controls .....	24
5.2 Proprietary Controls.....	24
5.3 Informational Devices.....	25
<b>6.0 ENFORCEMENT .....</b>	<b>25</b>
6.1 Governmental Controls .....	25
6.2 Proprietary Controls.....	25
6.3 Informational Devices.....	25



<b>7.0</b>	<b>REPORTING .....</b>	<b>26</b>
<b>8.0</b>	<b>REVIEWS.....</b>	<b>26</b>

## **FIGURES**

Figure 1. Butte Priority Soils Operable Unit (OU) Site Map  
Figure 2. Residential Metals Abatement Program 2020 Expansion Area  
Figure 3. Controlled Groundwater Area  
Figure 4. Excavation Control District Map  
Figure 5. BPSOU Source Areas and Superfund Stormwater Structures Access  
Figure 6. BPSOU Source Areas and Superfund Stormwater Structures Covenants

## **APPENDICES**

Appendix A Growth Policy/Zoning Ordinance  
Appendix B Final Order – Butte Alluvial and Bedrock Controlled Groundwater Area  
Appendix C Hook-up Ordinance and Water Quality District Implementation Plan  
Appendix D Excavation Ordinance/Protocols  
Appendix E Stormwater Ordinance/Design Standards  
Appendix F Community Protection Measures Program Plan  
Appendix G Institutional Controls Management System Plan  
Appendix H Example Deed Notice Forms and Access Agreements

## **REVISION SUMMARY**

<b>Modification No.</b>	<b>Author</b>	<b>Version</b>	<b>Description</b>	<b>Date</b>



## LIST OF ACRONYMS

AERL	ARCO Environmental Remediation, L.L.C.
AR	Atlantic Richfield
BABCGWA	Butte Alluvial and Bedrock Controlled Groundwater Area
BMFOU	Butte Mine Flooding Operable Unit
BMP	best management practices
BNSF	Burlington Northern Santa Fe Railway Company
BPSOU	Butte Priority Soils Operable Unit
BRES	Butte Reclamation and Evaluation System
BSB	Butte-Silver Bow
BTL	Butte Treatment Lagoons
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CGWA	controlled groundwater area
COCs	contaminants of concern
CPMP	Community Protective Measures Program
CTEC	Citizen's Technical Environmental Committee
DEQ	(Montana) Department of Environmental Quality
DMP	Data Management Plan
DNRC	(Montana) Department of Natural Resources and Conservation
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FLL	Ferry Lane Limited
GIS	Geographic Information System
ICMS	Institutional Controls Management System
LAO	Lower Area One
MS4	municipal separate storm sewer system
NPL	National Priorities List
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
QAPP	Quality Assurance Project Plan
QMP	Quality Management Plan
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RMAP	Residential Metals Abatement Program
ROD	Record of Decision
SOW	Statement of Work
TI	technical impracticability
UP	Union Pacific Railroad Company
WIC	Women, Infant, and Children
WQD	(BSB) Water Quality District



## 1.0 INTRODUCTION

### 1.1 ICIAP Overview

This Institutional Control Implementation and Assurance Plan (“ICIAP”) is designed to systematically: (a) establish and document the activities associated with implementing and establishing the long-term stewardship of the institutional controls (“ICs”) that have been or will be implemented at the Butte Priority Soils Operable Unit (“BPSOU”), and (b) specify the entities that will be responsible for conducting those activities. This ICIAP was developed in response to the unilateral administrative order issued by the United States Environmental Protection Agency (EPA) in 2011 (EPA Docket No. CERCLA-08-2011-0011). The ICIAP is structured according to the *Institutional Controls: A Guide to Preparing Institutional Control Implementation and Assurance Plans at Contaminated Sites*, Office of Solid Waste and Emergency Response (OSWER) 9200.0-77, EPA-540-R-09-002, December 2012, and is incorporated as Appendix E to the BPSOU Partial RD/RA and Operation and Maintenance Consent Decree (the “Consent Decree”). This ICIAP includes a discussion of the legal basis for the different types of ICs as well as a discussion of when and by whom the effectiveness of the ICs for BPSOU (and, for purposes of the Residential Metals Abatement Program (RMAP) only, the larger Butte Site) will be reviewed and how and by whom the ICs will be implemented, monitored, and enforced. Generally, Butte-Silver Bow County (BSB) has primary responsibility for the implementation, monitoring, and enforcement of most of the ICs described in this ICIAP with funding and support from Atlantic Richfield Company (Atlantic Richfield) and with oversight and support by the EPA, in consultation with Montana Department of Environmental Quality (DEQ). Atlantic Richfield also has certain direct responsibilities under the ICIAP.

### 1.2 ICIAP Objectives

This ICIAP describes the various ICs that have been or will be implemented within BPSOU. As necessary, the ICIAP includes or makes reference to other plans. Specifically, the ICIAP is intended to function together with a pending Remedial Design (“RD”)/Remedial Action (“RA”) Statement of Work (“SOW”) (RD/RA SOW) and the other management plans referenced in the RD/RA SOW to provide assurance that the remedies (Remedies) selected for BPSOU pursuant to the EPA 2006 Record of Decision (September 2006), the 2020 ROD Amendment, and explanations of significant differences thereto (collectively, the “BPSOU ROD”) will be maintained.

### 1.3 Role and Scope of ICs

As identified in the BPSOU ROD, ICs are non-engineering tools that serve to protect the response actions (past and future) implemented as part of the Remedies. At a minimum, the BPSOU ROD required the following ICs:

- a controlled groundwater area (CGWA) to prevent domestic use of contaminated water or spreading of existing contamination; and



- county zoning/permitting requirements, deed notices, and/or fencing/posting to ensure capped waste areas and other control measures are protected and not disturbed or impacted by development, and to ensure contaminated waste and soils excavated from any property are properly managed.

The ICs were later expanded during remedial design to include stormwater control ordinances to assist with the protection of remedial structures and overall protection of human health and the environment.

## **2.0 BACKGROUND**

The types of ICs selected and their roles in implementing and effectuating the Remedies are dependent upon site location, mining history/extent of contamination, selected remedy/previous response actions, and land use. Thus, an overview of these topics is included in this Section 2.0.

### **2.1 BPSOU Location**

The Silver Bow Creek/Butte Area National Priorities List (NPL) Site represents one of four contiguous Superfund Sites in the upper Clark Fork River Basin that extend 140 miles from the headwaters of Silver Bow Creek north of Butte to the Milltown Reservoir near Missoula, Montana. As identified in the Consent Decree, the area addressed by this ICIAP includes the BPSOU as defined in the 2006 ROD, as modified in the 2020 ROD Amendment; the portions of Silver Bow Creek and Blacktail Creek that run through the area shown in Figure 1; the Granite Mountain Memorial Interpretive Areas; and the alluvial groundwater that contains hazardous substances originating from the various facilities and sources within the BPSOU. The BPSOU covers an area of approximately five square miles within the Butte portion of the Silver Bow Creek/Butte Area NPL Site, encompassing the town of Walkerville, the part of Butte north of Silver Bow Creek and west of the Berkeley Pit, and a section of land that extends south from Silver Bow Creek to Timber Butte (Figure 1).

Outside of BPSOU, the area addressed by this ICIAP is limited to ICs for the RMAP expansion area and program. In the expanded RMAP area, homes and residential yards adjacent to the BPSOU may be sampled for lead, mercury (under certain circumstances) and/or arsenic in yard soil and/or attic dust at the owner's request, and homes and yards that exceed the RMAP action levels will also be remediated in the same manner as residential areas and other covered land uses within the BPSOU. The RMAP Map (Figure 2) defines this additional area in which yards and attics with elevated concentrations will be addressed as the Residential Metals Expanded Area. The BPSOU and the Residential Metals Expanded Area together are referred to as the Butte Site. The geographic boundaries of the Butte Site are illustrated on Figure 2.

### **2.2 Historic Use**

Mining, milling and smelting operations within the Butte area began in the 1860s, starting with placer and surface mining, and expanding into underground mining. While most of the mills and smelters in the Butte area closed by 1910, underground mining continued into the 1970s. Open pit mining on a large scale in the Butte area began in the Berkeley Pit in 1955 and continued until 1982, when the Berkeley Pit closed. Open pit mining in the East Berkeley Pit (now called



the Continental Pit) began in 1980 and continues today as part of the Continental Mine. Over the last 150 years, Butte area mines have produced an extraordinary amount of copper, as well as significant amounts of silver, zinc, manganese, molybdenum and other metals.

The BPSOU was established to investigate and remediate contamination arising from historic mining, milling and smelting operations. These past mining activities created numerous mine waste dumps while operation of mills, concentrators, and smelters generated tailings and other waste materials. Mining, milling and/or smelting wastes have also been used to construct some of the roads, railroad grades and rail yards in BPSOU. In addition, urban development on the Butte hill and in the city, including paving roads, parking lots and other large areas, has altered the stormwater runoff flowing across the BPSOU relative to pre-urbanization flows. These activities have contributed to the release of contaminants of concern (COCs) into various environmental media in the surrounding area, including the release of elevated concentrations of arsenic, cadmium, copper, lead, mercury, and zinc, in solid media, groundwater and surface water.

### **2.3 Selected Remedies/Completed Response Actions**

The remedies EPA selected in the BPSOU ROD include components to address: 1) contaminated solid media (mine waste, non-residential soil, and residential soil/dust); 2) alluvial groundwater; and 3) surface water (base flow and stormwater runoff). The remedy for contaminated solid media in non-residential areas is addressed using a combination of source removal, capping, and land reclamation. Residential yard soils and indoor dust in living spaces are sampled and, if action levels for arsenic, mercury and/or lead are exceeded, abated under the RMAP. The remedy for alluvial groundwater includes a combination of reducing loading from wastes left in place, capture and treatment of groundwater, implementation of a CGWA, and monitoring. The remedy for surface water consists of: 1) best management practices (BMPs), capping, and/or engineered controls to intercept runoff and settle solids carried by contaminated stormwater and snow melt; 2) removal of wastes, contaminated soil, and sediments along surface waters and other areas; 3) capture and treatment of contaminated groundwater that could discharge to surface water; and 4) monitoring. There are other components of the BPSOU ROD, such as the reclamation of the Syndicate Pit, as well.

Response actions within BPSOU began in 1988 and have included removal or capping of waste rock dumps, rail beds, and tailings piles. In addition, other actions include extensive revegetation, yard soil/attic dust removals, construction/operation of groundwater capture systems in the Silver Bow Creek drainage above its confluence with Blacktail Creek and Lower Area One (LAO) area, and construction/operation of a water treatment facility at Butte Treatment Lagoons (BTL).<sup>1</sup>

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<sup>1</sup> A State of Montana District Court decision known as *Silver Bow Creek Headwaters Coalition v. State of Montana*, DV-10-431 (August 17, 2015) declared that the surface area between Texas Avenue in Butte to the confluence of Blacktail Creek with Silver Bow Creek was named "Silver Bow Creek." This area is referred to here, geographically, as Silver Bow Creek above its confluence with Blacktail Creek. The EPA has called the surface area from Texas Avenue to the confluence with Blacktail Creek the "Metro Storm Drain" in prior Superfund removal and remedial documents and publications, including the 2006 Butte Priority Soils Operable Unit Record of Decision (BPSOU ROD)



## 2.4 Land Use

Current land use within BPSOU includes residential, commercial, industrial, and recreational use areas in an urban setting.

## 3.0 SELECTED BPSOU AND BUTTE SITE ICS

The ICs are non-engineered instruments, such as administrative and legal controls, that help to minimize the potential for exposure to contamination and/or protect the integrity of a response action (*Institutional Controls: A Guide to Planning, Implementing, Maintaining and Enforcing Institutional Controls at Contaminated Sites*, OSWER 9355.0-89, EPA-540-R-09-001, December 2012 [*“A Guide to ICs”*]). The ICs should be carefully evaluated, selected, and narrowly tailored to meet the cleanup objectives for the site in a manner that does not unnecessarily restrict the reasonably anticipated future land use or resources (Id. at p. 2).

The ICs are generally divided into four categories: governmental controls, proprietary controls, informational devices, and enforcement and permit tools (Id. at p. 2). The different categories of ICs are often more effective if they are layered (Id. at p. 9). Layering entails the use of more than one IC at the same time, all with the same goal. For example, proprietary controls in the form of restrictive covenants, governmental controls in the form of land use regulations, and informational devices all may relate to the same property and address the same residual contamination. The layering of ICs, however, should be commensurate with the amount, concentrations, toxicity, and other characteristics of residual contamination (Id.).

The selected ICs for the Butte Site include three of the four categories of ICs (governmental controls, proprietary controls, and informational devices), appropriately layered to address differing characteristics of residual contamination at areas within the Butte Site. This Section provides a summary description and analysis of the selected ICs for the Butte Site.

### 3.1 Governmental Controls

Governmental controls impose restrictions on land or resource use under the authority of a governmental entity (*A Guide to ICs* at p. 4). Typical examples of governmental controls include zoning and local groundwater use regulations (*Id.*). Under Montana law, local governments, such as BSB, have the authority to regulate land use through zoning or other forms of land use regulation for the purpose of protecting the health, safety, and general welfare of the people. The BPSOU ROD identified that the selected remedy needed to include the following minimum governmental controls:

1. “A controlled groundwater area will be established in the Alluvial Aquifer TI Zone

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and 2011 BPSOU Explanation of Significant Differences (ESD). Due to the Montana Department of Environmental Quality’s (DEQ’s) involvement in this document’s issuance, and where reference to this specific section of Silver Bow Creek is necessary, further geographic descriptions, such as Silver Bow Creek “east” or “above” its confluence with Blacktail Creek is used in order for DEQ to comply with the Court’s order. Reference to the area as “Silver Bow Creek” or “Silver Bow Creek east of its confluence with Blacktail Creek” is not and should not be construed as an admission or determination by any party on any procedural or substantive issue involving the area named Silver Bow Creek.



*to prevent domestic use of contaminated water, exacerbation or spreading of existing contamination, or release of highly contaminated groundwater to surface water resources through irrigation. The controlled groundwater area will prevent new well development, except for CERCLA monitoring wells, well systems that treat contaminated water prior to use, and the use of existing domestic and commercial wells. To the extent a controlled groundwater area will not prevent the use of existing wells, an education and well abandonment program will be implemented to persuade owners not to use contaminated water and to voluntarily take existing wells out of service in exchange, for example, for being hooked up to public water. An administrative entity will be identified to monitor and enforce these restrictions.”*

2. *County zoning and permit requirements will be implemented to ensure that capped waste areas, discrete areas of waste left in place, and other control measures such as storm water controls are not disturbed, mismanaged, or inappropriately developed and that waste taken from these areas is disposed of at the Butte Mine Waste Repository, or if identified as a hazardous waste disposed of at a RCRA C facility. These controls and permits are best implemented with adequate funding for appropriate redevelopment and re-use of affected sites.”*

### **3.1.1 Growth Policy/Zoning Ordinance**

Consistent with the provisions of Montana enabling legislation (M.C.A. §§ 76-1-601 to 76-1-606), BSB adopted an updated Growth Policy (including a master plan and zoning code) in 2008 to address community goals and objectives for both existing and future land uses. The Growth Policy is currently undergoing a further update. BSB implements its Growth Policy through its zoning ordinance. Specific to Superfund, the objective of this IC is to protect human health and the environment by adopting and enforcing zoning requirements that limit allowable land use and types of development to those that are consistent and compatible with the remedy. To achieve this objective, BSB shall: a) develop amendments to its existing zoning ordinance including rezoning of certain properties as open space consistent with RA plans and/or to complement other ICs (e.g., CGWA, excavation protocols, stormwater management regulations, private ICs restricting use, and development of capped waste areas or stormwater structures, etc.); and b) enforce its zoning ordinance requirements through the building permitting process. BSB’s progress on this task shall be reported to EPA and Montana DEQ along with the yearly progress reports described in Section 7.0. A link to the current growth policy/zoning ordinance is provided in Appendix A.

### **3.1.2 Controlled Groundwater Area**

A Petition for a Controlled Ground Water Area was filed by BSB in October 2008 to establish the Butte Alluvial and Bedrock Controlled Groundwater Area (“BABCGWA”) under state law. An additional separate controlled groundwater area, known as the Clark Tailings Controlled Groundwater Area, is located south of the BABCGWA. The area is monitored under the Resource Conservation and Recovery Act (RCRA) program and is outside the scope of this document. The Petition was filed to establish restrictions under state law upon the use and development of portions of the Butte alluvial and bedrock aquifers. These aquifers cross site



boundaries, therefore, the petition was structured to meet the requirements of RODs and/or Consent Decrees for the Butte Mine Flooding Operable Unit (“BMFOU”), BPSOU, and Montana Pole and Treatment Plant NPL Site. A Final Order granting the Petition was issued by the Department of Natural Resources and Conservation (“DNRC”) on October 30, 2009. The BPSOU IC program focuses on the BPSOU alluvial aquifer technical impracticability (“TI”) zone portion of the BABCGWA. The extent of the BABCGWA and the alluvial aquifer TI zone BPSOU CGWA are shown on Figure 3. A link to the Final Order is included in Appendix B.

The Final Order contains specific Findings of Fact and Conclusions of Law that support DNRC’s Order, and specific restrictions concerning groundwater and well use which have the force of law. Key elements of the Order include:

- (a) New groundwater wells, except Superfund or other environmental monitoring/treatment wells necessary for environmental cleanup purposes, are generally prohibited.
- (b) Existing domestic use wells for potable supply which exceed human health standards must be immediately abandoned for such purpose, and the Settling Defendants are responsible for making an alternative water source available to replace use of the well for potable supply.
- (c) Existing wells for irrigation or industrial use may be replaced at the Owner’s expense, but only if the conditions stated in the Order are satisfied.
- (d) The boundaries of the CGWA may be amended with the express written approval of the DNRC, the EPA, and the Montana DEQ.

The BSB Water Quality District (“WQD”) will continue to administer, monitor, and enforce the restrictions associated with CGWAs. The BSB WQD was established in February 1995. Those responsibilities include sampling of domestic or irrigation wells that remain in use inside or adjacent to the CGWA. A Quality Assurance Project Plan (“QAPP”), addressing CGWA well sampling procedures and requirements for both BMFOU and BPSOU, was prepared by MBMG for the BSB WQD and approved by EPA in consultation with DEQ (see *Final Private Well Monitoring QAPP*, May 2019). BSB WQD administers CGWA restrictions through the hook-up ordinance, as described in section 3.1.3. BSB, for the Settling Defendants, will report on a yearly basis (see Section 7.0) to EPA and DEQ concerning its efforts at monitoring and enforcing the CGWA – see Appendix C, Hook-up Ordinance and Water Quality District Implementation Plan.

### **3.1.3 Hook-up Ordinance**

BSB has a “hook-up” ordinance, Mandatory Connection Requirement-Exceptions-Use of Wells-Enforcement, Ordinance Number 13.20.210, that requires all prospective potable water users to hook into the BSB water system where municipal service is available, i.e., within 300 feet of an existing water main. The purpose of this IC is to prevent future domestic use of contaminated groundwater by requiring all prospective potable water users to hook into the BSB water system where municipal water service is available. Enforcement of the Final Order establishing the CGWA in conjunction with the hook-up ordinance and the private covenants described in Section 3.2 of this ICIAP fulfill the Superfund requirements for covenants that restrict the utilization of the groundwater for potable domestic use of the bedrock and alluvial aquifers, and



for the prevention of new well drilling in such aquifers. The hook-up ordinance enhances the CGWA and private covenants by requiring the majority of local water users, including those located in the BPSOU alluvial aquifer TI zone portion of the BABCGWA, to obtain their domestic water supply from the BSB municipal water system instead of from local wells. A link to the hook-up ordinance is provided in Appendix C. The EPA, in consultation with DEQ, may determine that additional land/water use restrictions are appropriate and Atlantic Richfield/BSB shall cooperate with EPA's and the State's efforts to secure such governmental controls. In addition, to the extent a CGWA will not prevent the use of existing wells, the WQD will implement, in conjunction with the BSB Public Works Water Division, EPA, DEQ, and the DNRC, an education, testing, and well abandonment program designed to: a) discourage inappropriate uses of groundwater from existing wells, and b) encourage owners to take existing wells out of service voluntarily. Additional detail on this program and proposed implementation schedule is provided in Appendix C.

BSB shall report all such monitoring and enforcement efforts to EPA and DEQ on a yearly basis (see Section 7.0). Applicable state law prohibitions (e.g., DNRC water well regulations) shall also be monitored and enforced by the State of Montana as appropriate.

#### **3.1.4 Excavation Ordinance**

In March 2009, BSB revised the former Reclaimed Areas Guidebook and republished the protocols for earth-moving in the document captioned the *Excavation and Dirt-Moving Protocols for All Dirt-work to be Performed in and Near the Butte-area Superfund Sites*. The purpose of this IC is to protect human health and the environment by taking appropriate measures to ensure contaminated soils disturbed during excavation or dirt moving activities do not migrate onto clean property, are not exported to any location except the Mine Waste Repository and are properly capped. EPA approved the republished protocol document in June 2009. In 2013, in order to give the protocol document legal effect, BSB enacted an Excavation Ordinance which sets forth the specific procedures and permitting requirements for enforcement of the *Excavation and Dirt-Moving Protocols for All Dirt-work to be Performed In and Near the Butte-area Superfund Sites*. The boundary of the excavation control district is shown on Figure 4. A link to the Excavation Ordinance and Protocol documents are provided in Appendix D. The procedures for sampling and analysis of excavated materials are provided in the Atlantic Richfield 2018 *Final Unreclaimed Sites Quality Assurance Project Plan* and/or the Atlantic Richfield *Final Reclaimed Areas Maintenance and Monitoring Quality Assurance Project Plan*. BSB shall report on the monitoring and enforcement of the Excavation Ordinance on a yearly basis (see Section 7.0).

#### **3.1.5 Stormwater Management Ordinance**

In 2011 BSB enacted an ordinance outlining the procedures, protocols, and/or requirements to implement and enforce effective stormwater management within the City of Butte. The primary purpose of the ordinance was to protect human health and the environment by adopting regulations for stormwater discharges from new site development, non-stormwater discharges to the storm drainage system, and by the creation of a stormwater utility. Actions that are subject to a Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA")



administrative order, Consent Decree, or enforcement action are exempt from the construction requirements described in the ordinance.<sup>2</sup>

The content of the stormwater ordinance includes:

- (a) Nationally accepted design standards;
- (b) Requirements that site-specific stormwater design plans be prepared and certified by registered professional engineers;
- (c) Requirements controlling the introduction of pollutants into the municipal separate storm sewer system (“MS4”) and prohibiting illicit connections and discharges to the MS4;
- (d) Requirements that will allow maintenance inspections by BSB personnel, including perpetual easements granted to BSB to conduct the inspections; and
- (e) Provisions for enforcement against violators and appropriate penalties.

BSB will report on the monitoring and enforcement of the Stormwater Management Ordinance on a yearly basis (see Section 7.0). A link to the stormwater ordinance and design standard documents is provided in Appendix E. The MS4 program provides a mechanism for citizens to report alleged violations of State stormwater regulation. Specifically, BSB’s stormwater management program website includes a web-based form and contact information to report observations of potential illicit discharges, construction project complaints or other violations of stormwater regulations.

### **3.1.6 Access Controls**

Although not an IC as EPA currently defines ICs, upon request by EPA, after consultation with DEQ, BSB or Atlantic Richfield shall construct, install, and maintain appropriate signage or fencing on BPSOU property to support Superfund remedial work, with the exception of property owned, operated or controlled by Union Pacific (UP) or Burlington Northern Santa Fe (BNSF) railroads. Signage or fencing, for example, may be required to address safety issues associated with construction or where community interest supports the need for explanatory signs; fencing with “no trespassing” signs may be appropriate to prevent unauthorized use and to control access to Source Area Properties or stormwater control basins. BSB shall report on the maintenance of Access Controls (i.e., fence repairs, etc.) on a yearly basis (see Section 7.0).

## **3.2 Proprietary Controls**

Proprietary controls are controls on land use that are considered private in nature because they tend to affect a single parcel of property and are established by private agreement between the property owner and a second party who, in turn, can enforce the controls (*A Guide to ICs* at p. 4). Common examples of proprietary controls include access agreements/easements providing rights for accessing and using properties and restrictive covenants/conservation easements that restrict use (*Id.*). Proprietary controls can serve to prohibit activities that might compromise the effectiveness of the Remedies or restrict activities or future resource use that might result in

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<sup>2</sup> Stormwater Management Ordinance, Section 13.32.210(e).



unacceptable risk to human health or the environment (*Id.*). The BPSOU ROD identified that the selected remedy needed to include the following minimum proprietary controls:

3. *“Deed notices will be required for all areas where wastes were capped and left in place or where engineered controls were constructed or other discrete wastes were left in place. The deed notices will notify current and subsequent landowners of the presence of these wastes or engineered controls and ensure that these wastes are not disturbed. In addition, fencing and signs may be required to ensure the integrity of caps and engineered controls.”*
4. *“Where private landowners require fencing or use posting for legitimate reasons relating to the prevention of remedy disruption, the Selected Remedy requires the installation of these fences or signs.”*

Restrictive covenants are the primary proprietary control for BPSOU. These include written restrictions or requirements placed on the title to real property that pass with the property and bind both current and future owners of the property.

Access rights and restrictive covenants are presently in place for much of BPSOU where response actions have or will occur, including properties identified as source areas (collectively, referred to as “Source Area Properties”) and other real property where stormwater conveyance and management structures (collectively referred to as “Superfund Stormwater Structure Properties”) are present. Access easements and restrictive covenants are or will be recorded in BSB’s property records and will run with the title of the land. Access easements and restrictive covenants are enforceable by Atlantic Richfield and/or BSB, DEQ and EPA as provided in the recorded instrument. EPA can also enforce through administrative or judicial enforcement actions.

Atlantic Richfield and BSB will take appropriate actions to enforce access rights and restrictive covenants on BPSOU property to support Superfund remedial work, if either of them, or EPA, or DEQ identify the need for such action (either through a lack of access or a violation of the use and development covenants or easement provisions). An allocation and settlement agreement between Atlantic Richfield and BSB (described in section 3.2.1 below) currently provides adequate funding for enforcement actions by BSB.

BSB and Atlantic Richfield have no obligation to take actions or enforce access rights and restrictive covenants on BPSOU property owned, operated or controlled by UP or BNSF. The implementation, monitoring, and assessment of ICs’ effectiveness on such property shall be the responsibility of UP and BNSF for their respective property, subject to further enforcement actions by EPA or DEQ.

The access rights and covenants are described in more detail below.

### **3.2.1 General**

Access rights and restrictive covenants have been created by Atlantic Richfield, BSB, and others using the mechanisms described below:



- (a) Contract and Conveyance Transactions. Access rights and restrictive covenants have been created, or will be created, as part of property conveyance transactions involving certain Source Area Properties, Superfund Stormwater Structure Properties, and other real property within the BPSOU. In general, the access rights and restrictive covenants have been placed in deeds or other instruments transferring property. In addition, pursuant to that certain Allocation and Settlement Agreement between Atlantic Richfield and BSB dated December 21, 2006, as amended (the “Atlantic Richfield/BSB Allocation Agreement”), BSB has agreed to provide Atlantic Richfield, EPA, and DEQ access rights to all real property owned or controlled by BSB, and such access rights will be granted for real property to be transferred to BSB under the Atlantic Richfield/BSB Allocation Agreement. Similarly, pursuant to that Allocation Agreement between ARCO Environmental Remediation, L.L.C. (“AERL”) and Ferry Lane Limited (“FLL”) dated July 27, 2004 (the “AERL/FLL Allocation Agreement”), FLL has also agreed to provide Atlantic Richfield (which for purposes of this ICIAP is defined to include its affiliate, AERL), EPA, and DEQ access rights to all property owned or controlled by FLL.
- (b) RMAP Access Agreements. BSB has implemented and will continue to implement the RMAP under an amended unilateral administrative order, and under any future consent decree for the Residential Solid Media Remedial Action (implemented through the RMAP on the date this ICIAP is approved) which the parties may enter. As part of the RMAP, BSB obtains access rights and covenants on properties within the Butte Site on which BSB has performed actions under the RMAP and will continue to seek access rights and covenants on properties on which it performs actions in the future (collectively, the “RMAP Properties”), as described in the BSB and Atlantic Richfield Multi-Pathway RMAP Plan (to be finalized, subject to EPA approval, in consultation with DEQ, and published in 2020). When access is denied, BSB will track the attempt to gain access of the property for environmental assessment within the RMAP database. Additional attempts to gain access will be made until three attempts are recorded, or access is granted. After three attempts are recorded, EPA and DEQ will be notified by BSB. On a case-by-case basis, EPA and/or DEQ may notify the property owner that a notice corresponding to the title records of the subject property could be recorded. A copy of the form notice letter EPA and/or DEQ will send to property owners who decline access is included as Appendix H. Copies of example RMAP access agreements (for comprehensive and interior dust only sampling/abatement) identifying terms, conditions and covenants for RMAP response activities are also included in Appendix H. Future changes in ownership will be monitored annually; if ownership changes access attempts will be reinstituted.

### **3.2.2 Access Easements**

#### **3.2.2.1 Atlantic Richfield/BSB Properties.**

Atlantic Richfield and BSB each presently own or formerly owned substantial Source Area Properties, Superfund Stormwater Structure Properties, and other real property within the BPSOU where response actions have been, or are anticipated to be, conducted. Most of the properties are currently subject to reserved access rights that provide access to EPA and DEQ for the purpose of addressing environmental conditions on the properties, including without



limitation response actions required under the BPSOU ROD. In addition, pursuant to the Atlantic Richfield/BSB Allocation Agreement, Atlantic Richfield and BSB have agreed that Atlantic Richfield will convey to BSB substantial property located within the BPSOU, including certain Source Area Properties and Superfund Stormwater Structure Properties. The following is a representative example of the access reservation that has been, or upon conveyance to BSB will be, used in the various conveyance documents:

Reservation. Grantor reserves an easement for the benefit of itself, the United States Environmental Protection Agency, the State of Montana, and Atlantic Richfield and each of their respective employees, agents, contractors, subcontractors, representatives, agents, successors, assigns and designees, to access, enter upon, and use any or all of the Property for purposes of ensuring compliance with, implementing or causing to be implemented any action required under Applicable Laws and/or the Allocation Agreement. Nothing in this Section shall be deemed to relieve Grantee of any of Grantee's obligations with respect to the Property or to impose on Grantor, the United States Environmental Protection Agency, the State of Montana, or Atlantic Richfield any obligation to perform any action with respect to the Property.

Additionally, as noted above, BSB has also contractually agreed pursuant to the Atlantic Richfield/BSB Allocation Agreement to provide Atlantic Richfield, EPA, and DEQ access rights to all Source Area Properties, Superfund Stormwater Structure Properties, and other property owned or controlled by BSB.

The Atlantic Richfield and BSB properties that will be subject to access rights on the date of lodging, or will be subject to access rights following completion of the Atlantic Richfield/BSB Allocation Agreement transfers, are included among the real property parcels shown on Figure 5 as "Source Areas and Superfund Stormwater Structures with Access." Note that additional source areas (and Source Area Properties) may be added and additional boundary adjustments may be made to Figure 5 based on the procedures included in the Solid Media Management Plan, and its respective attachments, as approved by EPA, in consultation with DEQ. Should any Source Area Properties or Superfund Stormwater Structure Properties be transferred to a third party, that property shall be made subject to reserved access rights for EPA and DEQ upon any such conveyance.

### **3.2.2.2 Third-Party Properties.**

Atlantic Richfield has over time (prior to lodging) conveyed some Source Area Properties to third parties. In those conveyances, reserved access rights have been included in the conveyance deeds to third parties in substantially the same form as that noted above. Reserved access rights have also been included in various conveyances of Source Area Properties that have occurred between third parties. Further, as noted above, FLL has also contractually agreed to provide Atlantic Richfield, EPA, and DEQ access rights to all Source Area Properties and other property owned or controlled by FLL pursuant to the AERL/FLL Allocation Agreement. FLL has also



agreed to include reserved access rights in conveyance of its Source Area Properties to any third party in the future. The Source Area Properties owned by third parties which are subject to access rights are also included among the real property parcels shown on Figure 5 as “Source Areas and Superfund Stormwater Structures with Access.”

Formal access rights are currently not in place at a limited number of third-party owned Source Area Properties and Superfund Stormwater Structures Properties identified as “3<sup>rd</sup> Party Source Areas and Superfund Stormwater Structures without Access” on Figure 5. If and to the extent that access to implement the BPSOU ROD, the Consent Decree, or any other consent decree which Atlantic Richfield and BSB may enter with EPA and DEQ is needed to any of these properties, or to any other real property within BPSOU owned by a third party, then Atlantic Richfield or BSB, as appropriate, shall use reasonable efforts to secure from such third parties an agreement to provide access to such property for the purpose of conducting all activities related to the implementation of the BPSOU ROD, including access, if necessary, for future operation and maintenance. Generally, reasonable efforts to obtain access to 3<sup>rd</sup> Party Source Areas and Superfund Stormwater Structures without access are anticipated to include:

1. A community awareness and education program to inform the community on the importance of allowing access for site inspection and maintenance;
2. A meeting with the landowner, Atlantic Richfield or BSB and EPA/DEQ representatives to reiterate the need for access and warn the landowner of the potential repercussions of denying access which could include recording by EPA of a notice corresponding to the title records of the subject property; and
3. Submittal by BSB of a certified access request letter to the landowner (an example Source Area/Butte Reclamation Evaluation System [BRES] access agreement template is provided in Appendix H).

If access for response work cannot be reasonably obtained from a third-party owner, EPA shall utilize its authorities under CERCLA to secure access in accordance with the Consent Decree. This could include recording of a notice corresponding to the title records of the subject property. A copy of the form notice letter EPA and/or DEQ will send to 3<sup>rd</sup> Party Source Area Properties and Superfund Stormwater Structures property owners who decline access is included in Appendix H. Future changes in ownership will be monitored periodically; if ownership changes access attempts will be reinstituted.

If any of the third-party owned Source Area Properties or Superfund Stormwater Structure Properties are acquired by Atlantic Richfield or BSB after lodging of the Consent Decree, appropriate access right shall be secured in the conveyance instrument from the third party to that Settling Defendant.

### **3.2.2.3 RMAP Properties.**

As noted above, as part of RMAP, BSB has obtained, and will continue to seek, access rights and access agreements (without payment of compensation for access) to the RMAP Properties within the Butte Site for any required additional response actions that may be necessary. These access agreements are kept on file by BSB, and the Notice of Covenants is recorded in the chain of title



to the property at issue in the BSB real property records, as required by the BPSOU ROD. The RMAP contains additional IC measures regarding education, outreach, and tracking programs associated with residential cleanup activities. The extent of the RMAP is shown in Figure 2.

### **3.2.3 Private Covenants**

#### **3.2.3.1 Atlantic Richfield/BSB Properties.**

As shown on Figure 6, most Source Area Properties and Superfund Stormwater Structure Properties currently are, or upon conveyance to BSB pursuant to the Atlantic Richfield/BSB Allocation Agreement shall be, subject to covenants that restrict the use and development of the property to the appropriate land use for the area in which they are located. Note that additional source areas may be added, and additional boundary adjustments may be made to Figure 6 based on the procedures included in the Solid Media Management Plan, and its respective attachments, as that Plan is approved by EPA, in consultation with DEQ.

Subject to certain exceptions called out on Figure 6 as “Source Areas and Superfund Stormwater Structures without Covenants,” most third-party owned Source Area Properties are also subject to covenants. The covenants are commonly referred to as either Developable Property Covenants or Dedicated Use Property Covenants depending on the current and anticipated use of that particular property.

The following are representative examples of the Developable Property Covenants that have been, or upon conveyance to BSB will be, used in the various conveyance documents:

**Mining Use.** There shall be no exploration for or mining, milling, processing, drilling, or any other method of development and/or production of any veins, loads, or mineral deposits (including, without limitation, hardrock minerals, sand, gravel, clay, or other similar naturally occurring substances) on the surface of the Property. Nothing in this Section shall prevent or preclude the excavation or removal of Borrow Materials from the Property for the purpose of conducting Response Actions and/or Operation and Maintenance Activities within the Site.

**Development.** Except as provided in this Section, there shall be no development or any other action of any kind or nature that in any way alters, disturbs, or interferes with the Response Actions undertaken on the Property. Any development on the Property must be undertaken by Grantee, at Grantee’s sole cost and expense, in accordance with and in a manner consistent with the requirements of Applicable Laws including, without limitation, the Butte Reclaimed Areas Guidebook.<sup>3</sup>

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<sup>3</sup> The BSB “Butte Reclaimed Areas Guidebook” was republished in 2009 as the “Excavation and Dirt-moving Protocols for All Dirt-work to be Performed in and Near the Butte-area Superfund Sites (June 2009).” The protocols were incorporated into the Excavation Ordinance adopted by BSB in 2013. *See* ICIAP, Section 3.1.4.



Water Wells [Alternative 1]. All use, construction, and/or drilling of water wells for any purposes (except for any testing, sampling, or monitoring wells that are required by or in conjunction with Applicable Laws and which are approved by governmental entities with jurisdiction over such matters) shall be prohibited.

Water Wells [Alternative 2]. All drilling, construction, and/or use of water wells and all development and treatment of groundwater supplies on, at, under, near, or associated with the Property shall strictly conform to and be consistent with the requirements of Applicable Laws and other applicable standards including, without limitation, the requirements: (i) of any decision document related to the Property issued by the United States Environmental Protection Agency or the Montana Department of Environmental Quality under Environmental Laws prior to, as of, or following the date of this Deed; (ii) of any Controlled Groundwater Area Order related to the Property issued by the Montana Department of Natural Resources and Conservation prior to, as of, or following the date of this Deed; and (iii) of any construction standards or rules for permitting of new wells or for use of groundwater for either potable or non-potable purposes. Grantee hereby assumes all risks that the groundwater supplies on, at, under, near, or associated with the Property will not meet certain water quality standards set forth in Applicable Laws and that such groundwater supplies on, at, under, near, or associated with the Property will not be useable, or will not be useable without treatment, for either potable or non-potable purposes. Notwithstanding any other term or provision of this Deed, Grantee shall be solely responsible for all costs, expenses, and fees of any kind or nature associated with the drilling, construction, and/or use of water wells and/or the development and/or necessary treatment of groundwater supplies on, at, under, near, or associated with the Property.

The following are representative examples of the Dedicated Use Property Covenants that have been, or upon conveyance to BSB will be, used in the various conveyance documents:

Mining Use. There shall be no exploration for or mining, milling, processing, drilling, or any other method of development and/or production of any veins, loads, or mineral deposits (including, without limitation, hard rock minerals, sand, gravel, clay, or other similar naturally occurring substances) on the surface of the Property. Nothing in this Section shall prevent or preclude the excavation or removal of Borrow Materials from the Property for the purpose of conducting Response Actions and/or Operation and Maintenance Activities within the Site.



Other Uses. There shall be no industrial, commercial, residential, or agricultural (including grazing) use or development (as defined in the Zoning Ordinance) of the Property.

Development. Except as provided in this Section, there shall be no development or any other action of any kind or nature that in any way alters, disturbs, or interferes with the Response Actions that have been undertaken or may in the future be undertaken on the Property. Any development and any other action of any kind or nature on the Property that will alter, disturb, or otherwise interfere with the Response Actions undertaken on the Property must be undertaken by Grantee, at Grantee's sole cost and expense, in accordance with and in a manner consistent with the requirements of Applicable Laws including, without limitation, the requirements of the Butte Reclaimed Area Guidebook.<sup>4</sup>

Water Wells. All use, construction, and/or drilling of water wells for any purposes (except for any testing, sampling, or monitoring wells that are required by or in conjunction with Applicable Laws and which are approved by governmental entities with jurisdiction over such matters) shall be prohibited.

The Source Area Properties and Superfund Stormwater Structure Properties owned by Atlantic Richfield or AERL that are, or upon conveyance to BSB pursuant to the Atlantic Richfield/BSB Allocation Agreement shall be, subject to either Developable Property Covenants or Dedicated Use Property Covenants are included in the properties shown on Figure 6 as "Source Areas and Superfund Storm Water Structures with Covenants." A form Developable Property and Dedicated Use Property deed, as appropriate, will be used for future conveyances to third parties where restrictive covenants are already in place.

Both EPA and DEQ have been, or upon conveyance to BSB shall be, granted certain rights and remedies relating to the enforcement of the Developable Property Covenants and the Dedicated Use Property Covenants. Representative examples of the rights and remedies that have been, or upon completion of the Atlantic Richfield/BSB Allocation Agreement transfers will be, granted to EPA and DEQ are as follows:

Enforcement of Covenants. Grantor, the United States Environmental Protection Agency, the Montana Department of Environmental Quality and each of the owners (as the same may appear from time to time) of the Benefited Properties shall have the right to enforce the Covenants. Each Covenant shall be enforceable, in perpetuity, to the fullest extent permitted by Montana law.

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<sup>4</sup> Please refer to the Footnote 3 for reference to the revised protocols BSB developed.



### **Remedies**

Remedies. All remedies available at law, in equity, or specifically provided in this Deed shall be available for the enforcement of the Covenants. The selection of remedies shall be within the sole discretion of the Enforcing Party.

Specific Performance. Grantee hereby specifically agrees that in addition to all other remedies available under this Deed, at law, or in equity, the remedy of “specific performance” shall be available to the Enforcing Party. Grantee hereby waives, to the fullest extent permitted by Montana law, any rights it may have to argue that specific performance is an inappropriate remedy.

Other Remedies. In the event that Grantee fails to comply with any of the Covenants, the Enforcing Party may notify Grantee in writing of the failure, which notice shall specify the item(s) of non-compliance. Grantee shall have 30 days following delivery of the notice to correct the items of non-compliance to the written satisfaction of the Enforcing Party that gave the notice. If Grantee does not cure the failure within 30 days following delivery of the notice, the Enforcing Party shall have the right, but not the obligation, to enter onto the Property to cure the failure and to charge to Grantee the costs incurred by the Enforcing Party in taking any such actions. Grantee shall promptly reimburse Grantor for all such costs incurred. Further, Grantee shall indemnify, defend, and hold harmless, the Enforcing Party, its agents, employees, or contractors from and against all claims against the Enforcing Party, or liabilities incurred by the Enforcing Party, in taking such actions. Nothing in this Section shall limit, qualify, or abrogate the Enforcing Party’s right to specific performance.

Attorney’s Fees. If the Enforcing Party is the prevailing party in any action brought by it, the Enforcing Party shall be entitled to reasonable attorneys’ fees and costs incurred in bringing such action.

Any Source Area Properties or Superfund Stormwater Structure Properties acquired by Atlantic Richfield or AERL after the date of lodging that are not already subject to restrictive covenants will be made subject to appropriate covenants or obligations when conveyed by Atlantic Richfield or AERL to BSB.

Certain Source Area Properties and Superfund Stormwater Structure Properties presently owned by BSB are already subject to Developable Property Covenants or Dedicated Use Property Covenants, as well as the enforcement rights and remedies noted above. The Source Area Properties and Superfund Stormwater Structure Properties owned by BSB that are already



subject to either Developable Property Covenants or Dedicated Use Property Covenants are also included in the properties shown on Figure 6 as “Source Areas and Superfund Storm Water Structures with Covenants.” Additionally, BSB owns certain Source Area Properties and Superfund Stormwater Structure Properties that are not currently subject to any restrictive covenants and are not subject to any agreement requiring the imposition of restrictive covenants upon conveyance to a third party. Those Source Area Properties or Superfund Stormwater Structure Properties, as well as any such property not already subject to restrictive covenants which is acquired by BSB after the date of lodging, will be made subject to either Developable Property Covenants or Dedicated Use Property Covenants, as appropriate, in any future conveyance by BSB. The Source Area Properties and Superfund Stormwater Structure Properties owned by BSB that are not currently subject to any restrictive covenants are depicted on Figure 6 as “BSB Source Area Properties and Superfund Stormwater Structure Properties—Covenants to be Imposed upon Conveyance.”

### **3.2.3.2 Third-Party Properties.**

Atlantic Richfield (including AERL) has over time (prior to the date of lodging of the Consent Decree) conveyed certain Source Area Properties to third parties. In those conveyances, Atlantic Richfield has included appropriate Developable Property Covenants or Dedicated Use Property Covenants, as well as appropriate enforcement rights and remedies for EPA and DEQ, in the conveyance deeds to the third parties. Developable Property Covenants or Dedicated Use Property Covenants have also been included in various conveyances of Source Area Properties that have occurred between third parties. Further, pursuant to the AERL/FLL Allocation Agreement, FLL has agreed to abide by Developable Property Covenants on all Source Area Property owned by FLL and has agreed to include Developable Property Covenants in any deed conveying its Source Area Properties to a third party. The Source Area Properties and real property owned by third parties on which Superfund Stormwater Structures are located and which are subject to Developable Property Covenants or Dedicated Use Property Covenants are also included in the properties shown on Figure 6 as “Source Areas and Superfund Storm Water Structures with Covenants.”

The restrictive covenants in the deeds in the transactions described above also include the following typical provisions:

- (i) a general covenant prohibiting the property owner from hindering, interfering with, or otherwise modifying any remedial actions that have been undertaken on the property;
- (ii) a covenant requiring the property owner to perform any property maintenance that may be required on the property; and
- (iii) a provision that permits the EPA and DEQ to enforce the obligations against the property owner.



There are a limited number of third-party owned Source Area Properties and Superfund Stormwater Structure Properties that are not subject to any restrictive covenants. Those Source Area Properties and Superfund Stormwater Structure Properties are depicted on Figure 6 as “3<sup>rd</sup> Party Source Area Properties and Superfund Stormwater Structure Properties—Without Covenants.” If any activities that may serve to alter, disturb, or interfere with the Remedies on any of those Source Area Properties or Superfund Stormwater Structure Properties are observed, then Atlantic Richfield and BSB shall use reasonable efforts to secure the agreement of the third-party owner to refrain from the activity. Generally, reasonable efforts will include:

1. A community awareness and education program to inform the community on the importance of protecting constructed Remedies;
2. A meeting with the landowner, Atlantic Richfield or BSB and EPA/DEQ representatives to warn the landowner of the potential repercussions of altering, disturbing, or interfering with the Remedies which could include recording by EPA of a notice corresponding to the title records of the subject property; and
3. Submittal by BSB of a certified letter to the landowner (an example BRES access agreement template with covenants identified is included in Appendix H).

If those efforts are unsuccessful, Atlantic Richfield and BSB shall request that EPA take enforcement actions against the third party as appropriate to protect the Remedies. If any of the third-party owned Source Area Properties or Superfund Stormwater Structure Properties are acquired by a Settling Defendant after the lodging of the Consent Decree, appropriate restrictive covenants shall be imposed in the conveyance instrument from the third party to that Settling Defendant. This could include recording of a notice corresponding to the title records of the subject property. A copy of the form notice letter EPA and/or DEQ will send to 3<sup>rd</sup> Party Source Area Properties and Superfund Stormwater Structures property owners who alter, disturb, or interfere with the Remedies is included in Appendix H.

### **3.2.3.3 Subsequent Conveyances.**

In most instances where restrictive covenants are imposed on Source Area Properties and Superfund Stormwater Structure Properties, a provision is included in the conveyance document which serves to require the owner to include certain disclosures in subsequent conveyance documents in order to help ensure that any subsequent owner receives actual notice of the applicable restrictive covenants and other obligations attendant to the Source Area Properties and Superfund Storm Water Structure Property. A representative example of a subsequent conveyance provision is as follows:

Provisions of Subsequent Conveyance Instruments. Grantee hereby agrees that in any subsequent conveyance of all or any part of the Property, or any interest in the Property (including without limitation any grant of an easement burdening the Property or any grant of a lease of all or any part of the Property), the Grantee shall include the following provisions in the deed or other conveyance instrument (completed appropriately to refer to this Deed and



modified only so as to fit appropriately in the context of the conveyance instrument):

Grantee hereby agrees to: (i) accept the Property subject to the Covenants set forth in that certain Quitclaim Deed dated \_\_\_\_\_, \_\_\_\_\_ and recorded on \_\_\_\_\_, \_\_\_\_\_ at Roll \_\_\_\_\_, Card \_\_\_\_\_ in the real property records of the City and County of Butte-Silver Bow (the "Covenant Deed"); and (ii) abide by and enforce the Covenants as the owner of the Property in accordance with the terms and conditions of the Covenant Deed.

Grantee hereby also agrees that in any subsequent deed or other conveyance instrument, it shall require the grantee in such deed or conveyance instrument to either (a) execute a deed or conveyance instrument which contains the agreements set forth in the immediately preceding paragraph, or (b) execute a separate acknowledgment attached to the deed or conveyance instrument which contains the agreements set forth in the immediately preceding paragraph.

In all instances, the restrictive covenants are structured as covenants that run with the land that will be binding upon any subsequent owners of the property. As noted in Paragraph 3(a) above, a form Developable Property and Dedicated Use Property deed, as appropriate, will to be used for future conveyances where restrictive covenants are in place.

#### **3.2.3.4 RMAP Properties.**

As noted above, through signature of the RMAP access agreements by the property owner (forms included in Appendix H), BSB has obtained, and will continue to obtain, covenants associated with the land on the RMAP Properties (defined in Section 3.2.1 above) within the Butte Site. The covenants are set forth in a Notice of Covenants that is recorded in the chain of title for the property in the BSB real property records. The following are the covenants that have been or will be obtained for each of the RMAP Properties:

Maintenance. In order to protect and preserve the Work performed on the Property, the Property Owner will keep the Property in good repair, normal wear and tear expected, and will notify BSB of any problems that may arise with the Work.

Sale, Lease, or Other Conveyance. The Property Owner will disclose the nature of the Work performed on the Property and the terms of these Covenants to any future purchaser, lessee or other occupant of the Property. If the Property Owner sells, leases, or otherwise conveys any portion of his/her right, title or interest in any portion of the Property, the Covenants set forth herein shall be included in or attached to the deed, lease or other conveyance



documents. The Property Owner shall also notify BSB of any sale, lease, or other conveyance of the Property.

Obligation to Comply with Residential Access Agreement. The terms and conditions of that certain Residential Access Agreement dated \_\_\_\_\_ shall be binding upon the Property Owners, successors, and assigns and all future purchasers, lessees, or other occupants of the Property.

In addition to BSB, both EPA and DEQ have been, or will be, granted the following rights and remedies relating to the enforcement of the RMAP covenants:

ENFORCEMENT RIGHTS - COVENANTS. BSB, EPA, MDEQ, and each of the Owners (as the same may appear from time to time) of the Benefited Properties shall have the right, but not the obligation, to enforce the Covenants. Each Covenant shall be enforceable, in perpetuity, to the fullest extent permitted by Montana law. All remedies available, at law, or in equity, shall be available for the enforcement of the Covenants. The selection of remedies shall be within the sole discretion of the party entitled to enforce the Covenants. The prevailing party in any action to enforce the Covenants shall be entitled to reasonable attorney's fees and costs incurred in such action.

### **3.2.4 Status Summary**

#### **3.2.4.1 Access Rights.**

The access rights created, or to be created, by Atlantic Richfield and BSB (as described in the Paragraph 3.2.2 above and in Figure 5) satisfy Atlantic Richfield's and BSB's respective obligations to provide access to real property as is required under Section XI (Access and Institutional Controls) of the Consent Decree, as of the date of lodging of the Consent Decree. Further, as provided above, Atlantic Richfield and BSB, respectively, shall provide access for response actions as required by Section XI (Access and Institutional Controls) of the Consent Decree to any property within BPSOU that is acquired by Atlantic Richfield or by BSB following the date of lodging. Any other parties who become Settling Defendants under a BPSOU or Butte Site Consent Decree will be required to commit to and provide access to their respective real property within BPSOU that each owns prior to or each may acquire following the date of lodging for all response actions under the Consent Decree, as required by Section XI (Access and Institutional Controls).

#### **3.2.4.2 Restrictive Covenants.**

In review of the information and commitments provided in Paragraph 3.2.2, EPA and DEQ have determined that the existing restrictive covenants described in Paragraph 3.2.3 and Figure 6 are adequate for the purpose intended and Atlantic Richfield and BSB shall have no obligation under



Section XI (Access and Institutional Controls) of the Consent Decree to create any new restrictive covenants or use restrictions on any Source Area Properties, any Superfund Stormwater Structure Properties, or any other real property within the BPSOU that is owned by Atlantic Richfield or BSB. The restrictive covenants described in Section 3.2.3 and Figure 6 satisfy the requirements of the Consent Decree for the Settling Defendants' implementation of private land use restrictions.

### **3.3 Informational Devices**

Informational devices are tools that serve to provide information and educate the community about the presence of residual contamination that remains within the site and the measures to reduce risk (*A Guide to ICs* at p. 4). Common examples of informational tools are educational advisories, recorded notices in property records, and tracking systems (*Id.*). The BPSOU ROD included the following description/requirements for BPSOU informational devices:

*“Informational Devices. Tools that provide information or notification that residual or capped contamination may remain on site constitute an IC. Such tools, already established by BSB County, in cooperation with Atlantic Richfield, include the Blood Lead Poisoning and Abatement Program and a geographical information system.”*

#### **3.3.1 Notice of Settling Defendants' Real Property Ownership in BPSOU**

Paragraph 10.a of the Consent Decree requires that the Settling Defendants prepare a notice which describes the Consent Decree and illustrates the location of Source Area Property within the BPSOU, including Settling Defendants' ownership or control of such real property. The purpose of the notice is to inform the public that the federal district court has approved and entered the Consent Decree, and the Settling Defendants' implementation of Work related to Source Area Property, pursuant to the Consent Decree.

Upon EPA approval of the content of the notice, as provided in the Consent Decree, the notice together with a copy of Appendix G to the Consent Decree (Map of Source Areas) will be posted by BSB and available for public review in the following offices within the Butte-Silver Bow Courthouse. The Courthouse is located at 155 W. Granite Street, Butte, MT.

#### **3.3.2 Community Protective Measures Program**

The Community Protective Measures Program (CPMP) is the primary tool for providing risk education to the community. The CPMP provides a range of information to enhance and maintain the Butte community's awareness of potential sources of and risks to arsenic, lead and/or mercury in and around homes and commercial properties, as well as approaches residents can take to avoid exposures. The educational components include the distribution of educational materials to local contractors (e.g., electricians, roofers, carpenters), hardware/lumber suppliers, childcare facilities/programs (e.g., Head Start), and housing authorities (e.g., Human Resource



Council). Informative presentations are also available for real estate agents and landlords. Periodic mailings to property owners and public service announcements aired by the local television station are also designed to provide public awareness. Outreach will also rely on the medical community, particularly pediatricians and the Women, Infant, and Children (WIC) program to inform the public about risk, health monitoring, and the RMAP activities. The RMAP also participates in community health fairs and family fairs to provide outreach to the community.

The education and outreach program specifically addresses portions of homes and commercial buildings that pose a risk for potential exposure. Such portions addressed are the attic space, interior living space, and exterior yard areas. The program relies on educational materials and face-to-face consultations to ensure that homeowners, remodeling contractors, developers, home inspectors, potential buyers, and weatherization workers are aware of:

- (1) The potential presence of arsenic, lead and/or mercury in attics or earthen basements;
- (2) The importance of restricting access to those areas by sensitive populations and taking the appropriate measures to ensure that dust is not tracked into the interior living space when infrequent access occurs; and
- (3) The proper contact information prior to implementing any remodeling project and/or landscaping project to ensure that dust and soil are appropriately handled and disposed of by a responsible entity and/or by approved contractors.

Educational materials are provided to all participants of the program at the time when an environmental assessment of the home is implemented (whether interior or exterior) as well as when applicable building permits are sought for remodeling projects. Recommendations made to each resident will be based on the results of environmental sampling at their homes and specific information collected by program staff regarding daily habits and activities. For further details, see the CPMP Plan provided in Appendix F.

### **3.3.3 Geographic Information System**

The Geographic Information System ("GIS") is a computer-based tool that incorporates both geographic information functionality and institutional controls management functionality. The geographic information functionality will use spatial data for mapping, analyzing, and storing information and data for all properties within BPSOU (e.g., aerial photographs and information regarding property ownership, access rights, restrictive covenants, remedial actions, environmental sampling data, and "as built" details) and, within the Butte Site, for those properties that are addressed under the RMAP. The information and data will be characterized by "metadata" identifying: (i) the party who developed the information or data; (ii) whether the information or data remains as draft; and (iii) whether the information or data has been reviewed and undergone a quality review process or, in the case of environmental sampling data, a data validation process.

Over the past 20 years, BSB has developed, and continues to further develop, a GIS, with requisite staff, to store vital data and run applications pertinent to implementing ICs. In addition,



as related to the Butte Site, BSB provides GIS services and maps to EPA, DEQ, Atlantic Richfield, and their employees, agents, representatives, and contractors, upon request. BSB shall operate the GIS tool (with updated software and hardware) and provide GIS and other data management services as follows:

- (a) All data and other information obtained in connection with Response Actions performed within BPSOU by Atlantic Richfield or BSB or any other Person or Governmental Entity;
- (b) All data and other information obtained in connection with Operation and Maintenance Activities within BPSOU, performed by Atlantic Richfield or BSB (data will be recorded, stored, and managed in a separate database);
- (c) All data and pertinent information compiled as part of the implementation of the Butte Reclamation and Evaluation System (“BRES”) including establishing an application that provides a mechanism for community members to report issues with capped areas or stormwater conveyance systems;
- (d) All data and other information in connection with RMAP property investigations, including the BPSOU ROD and 2011 BPSOU Explanation of Significant Differences (ESD)-required systematic sampling, assessment, and abatement (if action levels are exceeded) of all residential properties with the BPSOU and attic dust in residential properties within the Butte Site along with tracking: 1) properties for which access has been obtained, properties sampled, and cleanup completed; 2) properties where access has been denied (and data for such properties); and 3) residential attics that would be cleaned up IF a pathway occurs in the future through remodeling;
- (e) All data and information relating to applicable requirements under the Growth Policy, Flood Plain re-designation and/or Zoning Ordinance;
- (f) All data and information relating to CGWA; and
- (g) All data and information relating to applicable real property use restrictions, covenants, and obligations, including establishing a public web site that provides information on restrictive covenants.

Documentation on the GIS is provided in the Institutional Controls Management Systems Plan (ICMS), Appendix G. As noted in Appendix G, the ICMS will continue to evolve with technology and databases will be updated and modified as applicable.

## **4.0 MONITORING**

### **4.1 Governmental Controls**

BSB will be primarily responsible for monitoring compliance with the governmental controls described in Section 3.1. Monitoring compliance with the governmental controls will occur as part of BSB’s routine government functions and will specifically include regular monitoring by



BSB of “811 call before you dig” calls. Pursuant to M.C.A. § 69-4-503, any person planning to excavate, drill, or perform other subsurface activities is required to notify the designated one call notification center. If non-compliant activities are observed or identified by BSB (i.e., excavations within the Butte Site proceeding without a required development permit), BSB has agreed pursuant to BSB/Atlantic Richfield Allocation Agreement to take appropriate steps to compel compliance through informal communications and, when necessary, through enforcement action.

## **4.2 Proprietary Controls**

Atlantic Richfield and/or BSB will be primarily responsible for monitoring compliance with the proprietary controls described in Section 3.2. Monitoring will occur as part of Atlantic Richfield’s and/or BSB’s routine inspection and maintenance activities associated with the remedy. Monitoring will also occur through direct coordination between Atlantic Richfield and BSB with respect to permit applications received by BSB for developments within BPSOU.

## **4.3 Informational Devices**

The informational devices and related components described in Section 3.3 do not require any direct monitoring. The informational devices, however, will be implemented by BSB in accordance with the Multi-Pathway RMAP Plan. BSB has agreed to implement its duties and obligations under the Multi-Pathway RMAP Plan pursuant to the terms and conditions of the Atlantic Richfield/BSB Allocation Agreement.

# **5.0 MODIFICATION/TERMINATION**

## **5.1 Governmental Controls**

The governmental controls described in Section 3.1 are subject to modification by BSB, in consultation with Atlantic Richfield and EPA. BSB has agreed not to adopt any amendments to the governmental controls which are inconsistent with the BPSOU ROD or any Consent Decree that BSB and Atlantic Richfield may enter for the BPSOU or the Butte Site. BSB has also agreed to provide Atlantic Richfield, EPA, and the State with a copy of all proposed amendments to the governmental controls and an opportunity to review and comment on all such amendments prior to their adoption. BSB has further agreed to provide Atlantic Richfield, EPA, and the State with a copy of all adopted amendments.

## **5.2 Proprietary Controls**

The restrictive covenants described in Section 3.2 are covenants running with the land but are subject to modification and termination in accordance with their terms. The typical modification/termination provision set forth in the deeds relating to Source Area Properties and Superfund Stormwater Structures requires that any modification be in writing approved by Atlantic Richfield or its affiliate, AERL, and the owner of the parcel burdened by the restrictive covenant to be modified and recorded in the BSB County real property records. Notwithstanding the terms of the deeds, Atlantic Richfield will secure and will cause AERL to secure the written



approval of EPA prior to agreeing to any modification or termination of the restrictive covenants set forth in the deeds.

### **5.3 Informational Devices**

The RMAP educational components described in Section 3.3 are intended to exist in perpetuity but components may be modified or terminated based on information obtained through the implementation process. All proposed modifications or terminations of components will be addressed in the annual reports required pursuant to Section 7.0 and will be subject to prior written approval by EPA prior to implementation. Additionally, the RMAP educational components will be reviewed during each Five-Year Review for BPSOU. Based on the results of the reviews, components of the RMAP educational components may be modified or terminated.

## **6.0 ENFORCEMENT**

### **6.1 Governmental Controls**

Enforcement of the governmental controls identified in Section 3.1 is BSB's responsibility and obligation. Enforcement includes, but is not limited to, ensuring land use development is consistent with land use classification and remedial action structures, restricting new wells in the CGWA, requiring hook-ups for prospective potable water users, issuing permits for excavation/dirt moving, and requiring stormwater management plans/permits for new development. BSB is also responsible for issuing non-compliance orders for not obtaining a permit or not complying with permit conditions and/or assessing fines. A person or entity that violates or fails to comply with the governmental controls may also be subject to appropriate enforcement actions by EPA and/or DEQ under CERCLA or CECRA.

### **6.2 Proprietary Controls**

The restrictive covenants set forth in the applicable deeds may be enforced by Atlantic Richfield, BSB, DEQ, and/or EPA where and to the extent each is the beneficiary of the covenants. Enforcement rights include the possibility of injunctive relief or damages or both. The restrictive covenants set forth in the RMAP Notice of Covenants may be enforced by BSB, DEQ and/or EPA. By way of injunctive relief, the owner of the property subject to covenants may be ordered to comply with the terms of the covenants. For instance, injunctive relief may include ordering the owner of the property that is subject to the covenant to cease use of the property for prohibited purposes, to remove structures erected in violation of the covenants, and to take actions (such as maintenance of fences) consistent with the covenants. A person or entity that violates applicable restrictive covenants or otherwise interferes with the Remedies shall also be subject to appropriate enforcement actions by EPA under CERCLA.

### **6.3 Informational Devices**

The RMAP educational components and GIS are informational tools and do not create any rights or obligations directly enforceable against specific persons or properties.



## 7.0 REPORTING

Atlantic Richfield and BSB will prepare and provide annual reports to EPA and the State summarizing the activities undertaken during the prior year to implement and enforce the ICs for the Butte Site. The annual reports will be submitted by end of March of the following year and will, at a minimum, include summaries of the following:

1. The activities undertaken by BSB with respect to implementation and enforcement of the governmental controls during the reporting period;
2. A description of any recommended modifications to the IC program that should be implemented in the future based on information obtained during the reporting period;
3. A compilation of the number of earthwork or stormwater management applications received within BPSOU and the number and types of permits issued during the reporting period;
4. A description of any IC's non-compliance encountered during the prior year with respect to either the governmental controls or the proprietary controls including a summary of relevant facts related to the event of non-compliance, and the actions undertaken or being undertaken by BSB and/or Atlantic Richfield to secure compliance or enforcement of the ICs;
5. A summary description of the activities undertaken by BSB during the reporting period to maintain and update the Superfund databases; and
6. An updated list and map of all properties to date where sampling, assessment, and abatement activities have been implemented (unless such a list is provided in the annual RMAP report).

Additionally, if issues arise with the implementation or enforcement of particular ICs, EPA and DEQ will be notified promptly and the issues and the actions taken will be summarized in the annual report.

## 8.0 REVIEWS

In order to ensure that the ICs remain in place and continue to be effective, the IC records of BSB and Atlantic Richfield will be available for periodic inspection and review by EPA and the State upon request. Additionally, appropriate representatives of BSB, Atlantic Richfield, EPA, and the State will meet and confer annually to review and discuss the overall effectiveness of the Butte Site ICs. Periodic monitoring of the effectiveness of the ICs will also be accomplished through the five-year review process mandated by CERCLA Section 121, 42 U.S.C. § 9621.



## **FIGURES**

**Figure 1. Butte Priority Soils Operable Unit (OU) Site Map**

**Figure 2. Residential Metals Abatement Program 2020 Expansion Area**

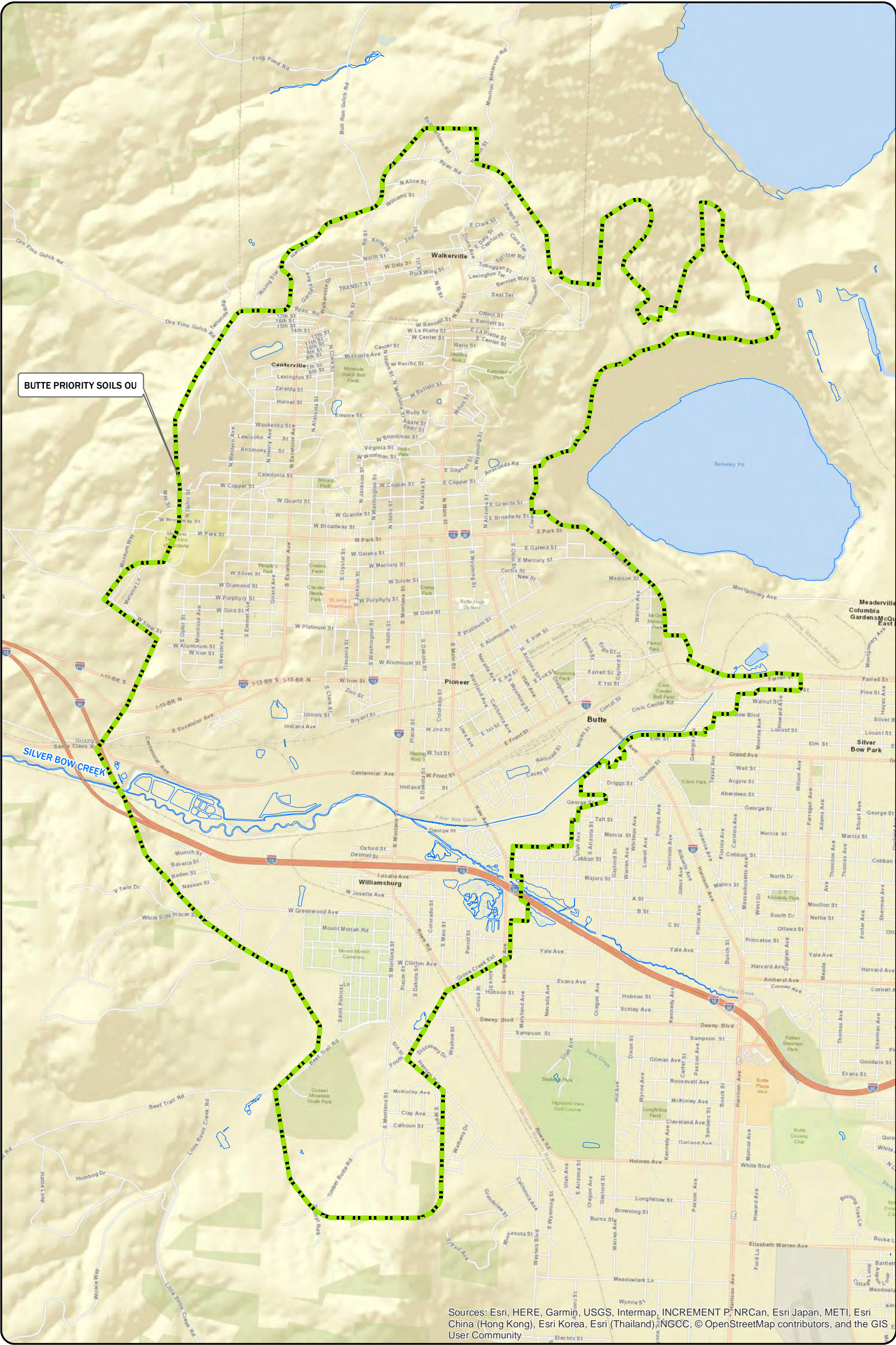
**Figure 3. Controlled Groundwater Area**

**Figure 4. Excavation Control District Map**

**Figure 5. BPSOU Source Areas and Superfund Stormwater Structures Access**

**Figure 6. BPSOU Source Areas and Superfund Stormwater Structures Covenants**





Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

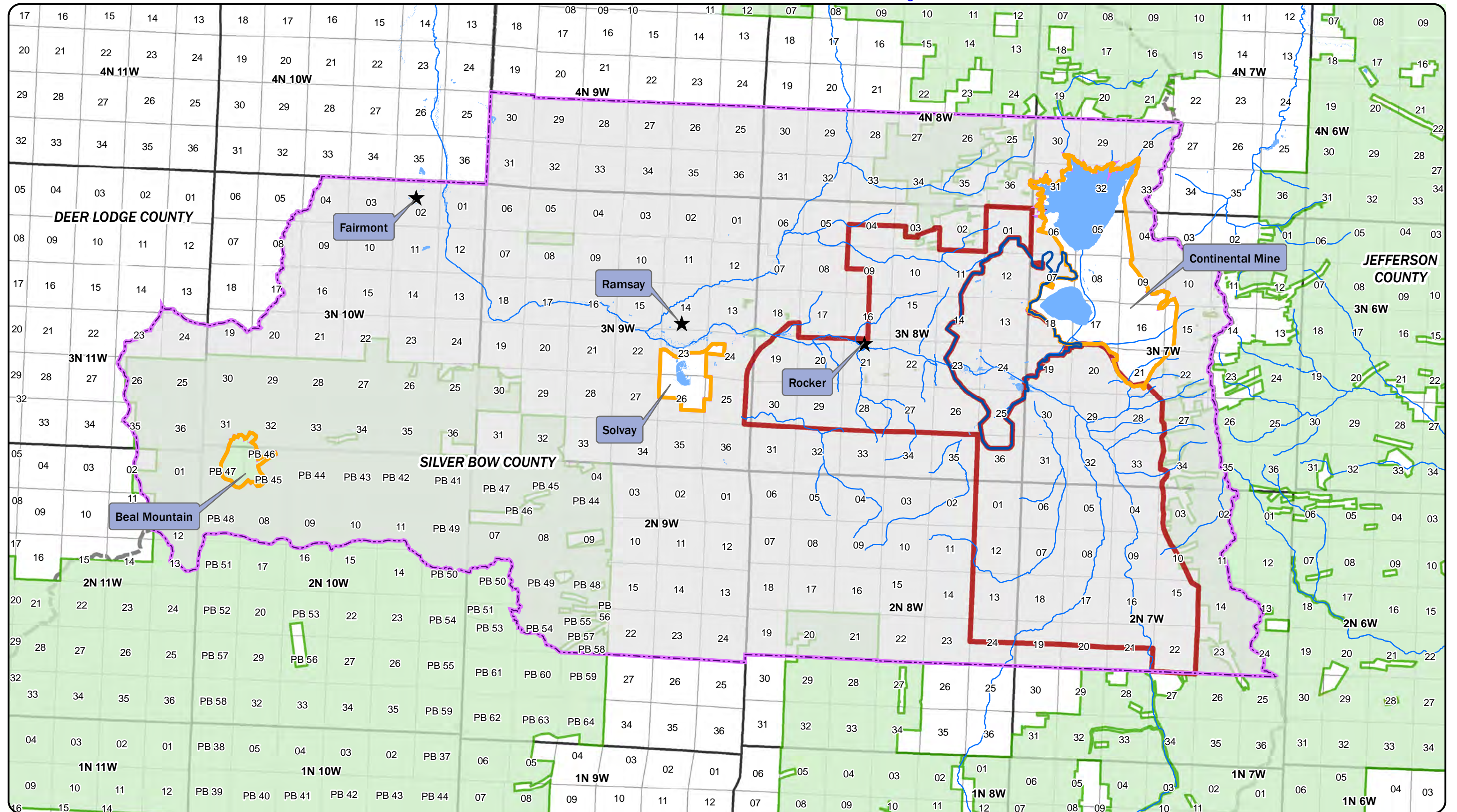
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 DATUM: NAD 83  
 UNITS: INT'L FT  
 SOURCE: PIONEER/BSB/ESRI

**FIGURE 1**

**BUTTE PRIORITY SOILS  
OPERABLE USNIT SITE MAP  
SILVER BOW CREEK/  
BUTTE AREA NPL SITE**

DATE: 10/08/2019





LEGEND

BPSOU BOUNDARY

2020 ADJUSTED RMAP BOUNDARY

AREAS EXCLUDED FROM RMAP (CONTINENTAL MINE, SOLVAY, BEAL MOUNTAIN)



2011 RESIDENTIAL METALS EXPANDED AREA



COUNTY BOUNDARY



US FOREST SERVICE

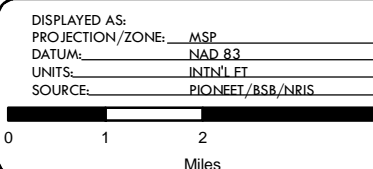
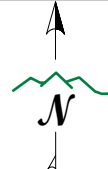


FIGURE 2

RESIDENTIAL METALS  
 ABATEMENT PROGRAM,  
 BUTTE PRIORITY SOILS  
 OPERABLE UNIT

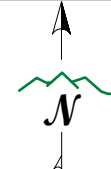
DATE: 10/08/2019





LEGEND

- BPSOU CGWA (BPSOU ALLUVIAL AQUIFER TI ZONE)
- BABCGWA (BUTTE ALLUVIAL AND BEDROCK CONTROLLED GROUNDWATER AREA)
- BPSOU BOUNDARY



DISPLAYED AS: \_\_\_\_\_  
 PROJECTION/ZONE: MSP  
 DATUM: NAD 83  
 UNITS: INT'L FEET  
 SOURCE: PIONEER/BSB/ESRI

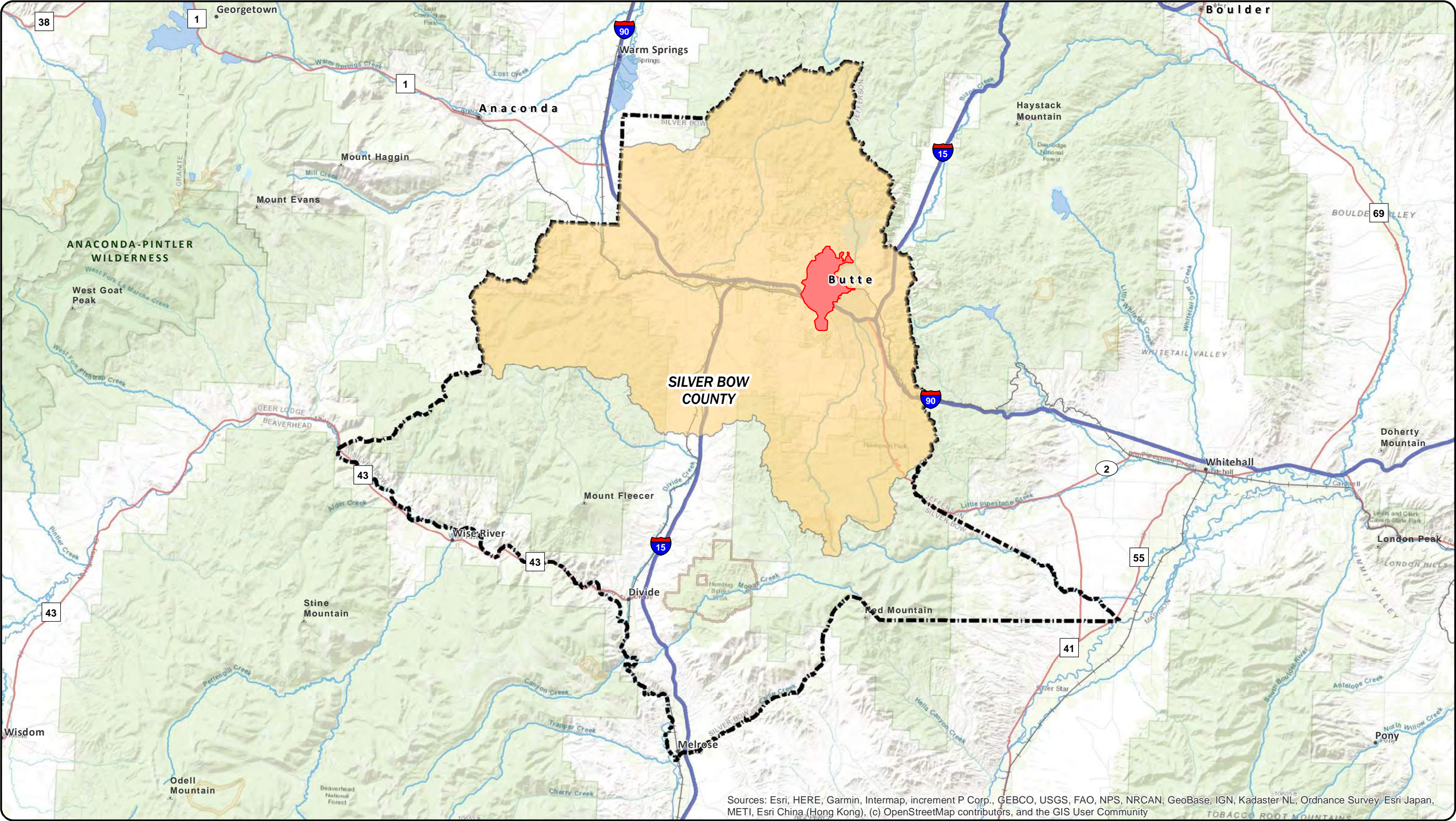
0 1,000 2,000 4,000  
Feet

FIGURE 3

DATE: 10/08/2019

**BPSOU  
CONTROLLED  
GROUNDWATER  
AREA**





**LEGEND**

BPSOU BOUNDARY

COUNTY BOUNDARY

BUTTE SILVER BOW EXCAVATION CONTROL DISTRICT

DISPLAYED AS:  
 PROJECTION/ZONE: MSP  
 DATUM: NAD 83  
 UNITS: INT'L FEET  
 SOURCE: PIONEER/BSB/ESRI

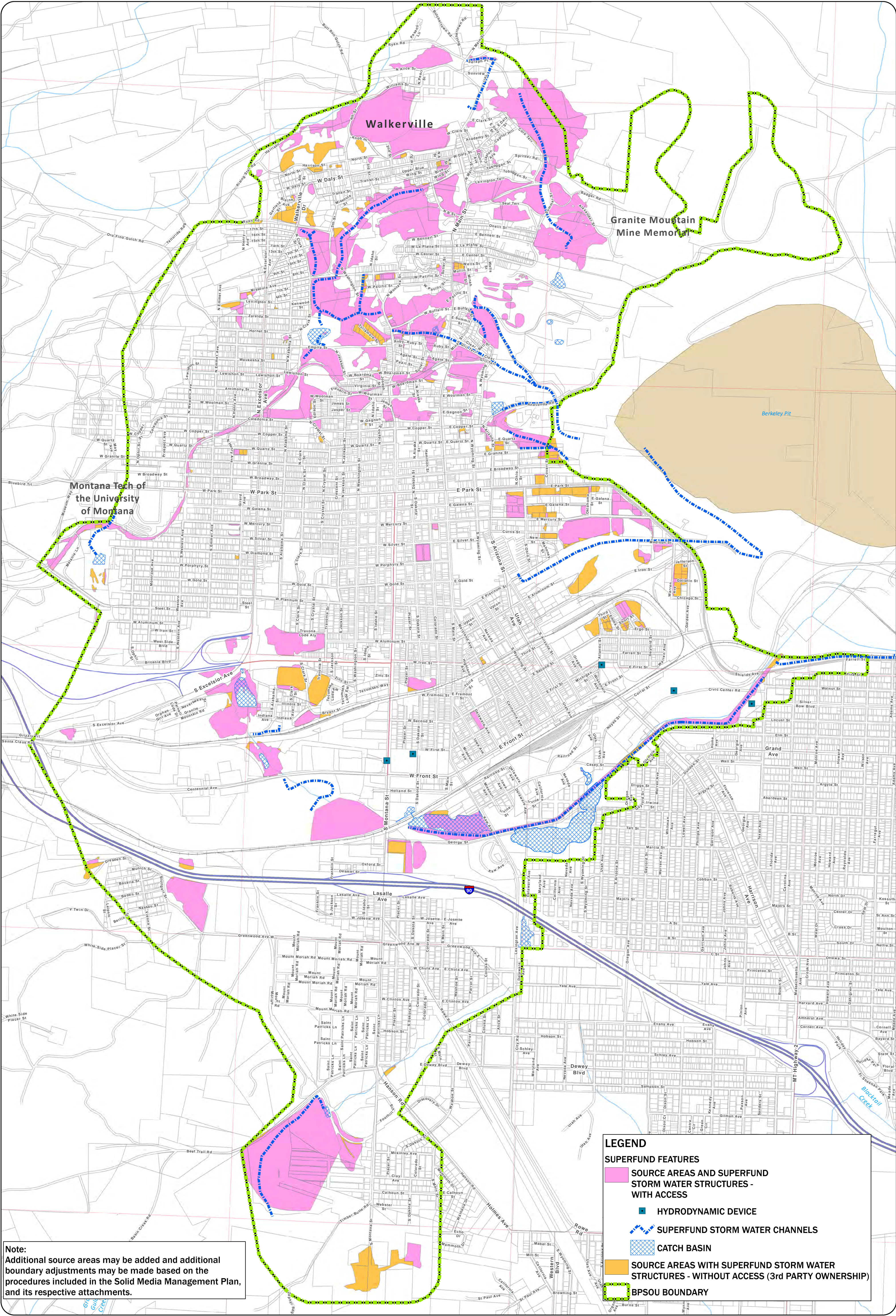
0 2.5 5 10 Miles

**FIGURE 4**

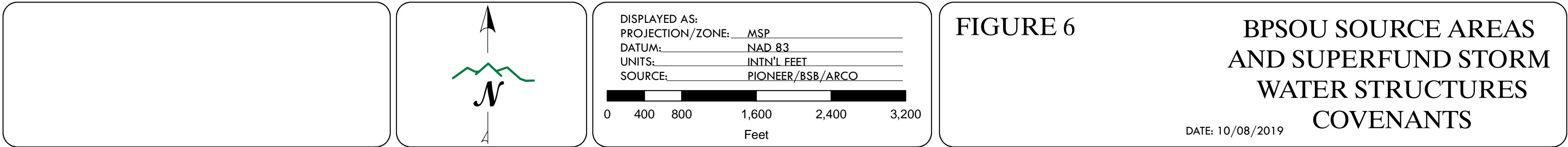
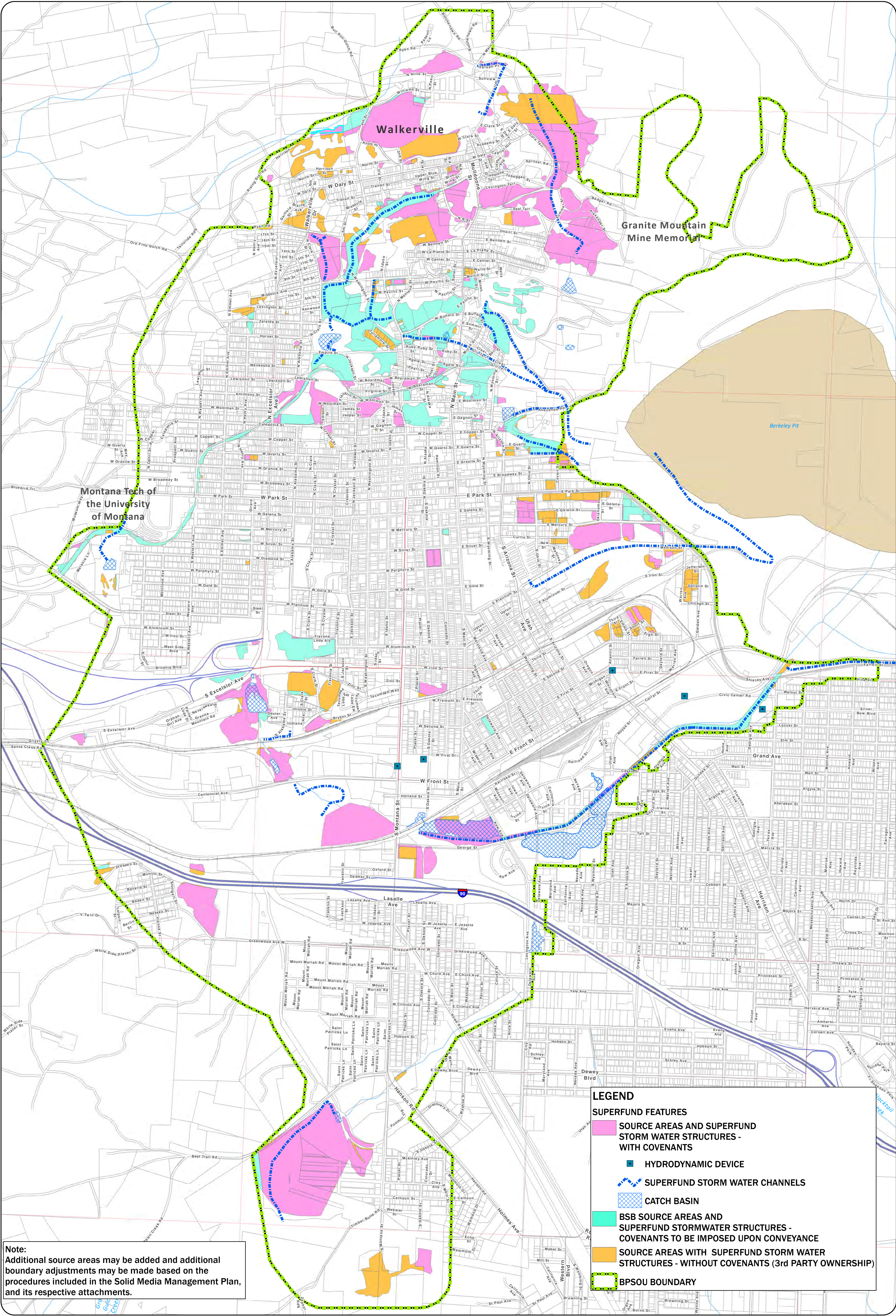
**EXCAVATION CONTROL DISTRICT MAP**

DATE: 10/08/2019











## **APPENDICES**



## **Appendix A**

### **Growth Policy/Zoning Ordinance**

Current growth policy and zoning ordinance information are available from the Butte-Silver Bow County website at <https://co.silverbow.mt.us/>. Search for the following as appropriate:

*Growth policy*

*Zoning ordinance*

*Butte-Silver Bow Interactive Zoning Map*

Municipal codes are at this site. [https://library.municode.com/mt/butte-silver\\_bow\\_county/codes/code\\_of\\_ordinances](https://library.municode.com/mt/butte-silver_bow_county/codes/code_of_ordinances).



## **Appendix B**

### **Final Order – Butte Alluvial and Bedrock Controlled Groundwater Area**

Current alluvial and Controlled Groundwater Area information is available from the Butte-Silver Bow County website at <https://co.silverbow.mt.us/>. Search for Controlled Groundwater Areas Fact Sheet.

The Final Order: *In the Matter of Butte Alluvial and Bedrock Petition for Controlled Ground Water Area No. 76g-3004383* is available at Department of Natural Resources and Conservation site: [http://dnrc.mt.gov/divisions/water/water-rights/docs/cgwa/butte\\_alluvial\\_final\\_order.pdf](http://dnrc.mt.gov/divisions/water/water-rights/docs/cgwa/butte_alluvial_final_order.pdf). It is also included on the next page.



## **Appendix C**

# **Hook-up Ordinance and Water Quality District Implementation Plan**

Current hook-up ordinance information is available from the Butte-Silver Bow County website at <https://co.silverbow.mt.us/>. Search for *code of ordinances*, *municipal codes*. Specifically, Chapter 13.20.210 – Water System Regulations at this site: [https://library.municode.com/mt/butte-silver\\_bow\\_county/codes/code\\_of\\_ordinances?nodeId=TIT13PUUT\\_CH13.20WASYRE\\_ARTI\\_VWAUSCO](https://library.municode.com/mt/butte-silver_bow_county/codes/code_of_ordinances?nodeId=TIT13PUUT_CH13.20WASYRE_ARTI_VWAUSCO)

### **Water Quality District Well Expansion Implementation Plan**

#### **1.0 Butte Silver Bow Water Quality District Mission Statement**

The mission of the District is to preserve, protect, and improve the quality of surface and groundwater resources within Butte-Silver Bow. Further, the goal of the Water Quality District (WQD) is to prevent human exposure to contaminants of concern (COCs) present in the surface water and groundwater within Butte-Silver Bow.

#### **2.0 Problem Definition and Background**

The Butte-Silver Bow WQD was officially formed through Resolution by the Butte-Silver Bow Council of Commissioners in February of 1995. Passage of the Resolution showed the importance of having local control and input into protecting vital water resources within Butte-Silver Bow.

Groundwater in and around Butte, Montana, has been impacted by over 100 years of mining, milling, smelting, and other mining-related activities. The extent and dispersed nature of groundwater contamination have rendered portions of the aquifer technically impracticable to cleanup to the point that groundwater will meet state and federal drinking water standards. Thus, a Technical Impracticability (TI) waiver has been granted for those portions of the aquifer. In 2009, the Montana Department of Natural Resources and Conservation (DNRC) established the Butte Alluvial and Bedrock Controlled Groundwater Area (BABCGWA) for the area potentially impacted by mining-related activities in and around Butte, Montana (Appendix B of the Institutional Controls Implementation and Assurance Plan). The BABCGWA was designed to address groundwater associated with the Butte Mine Flooding Operable Unit (BMFOU), Butte Priority Soils Operable Unit (BPSOU), and Montana Pole and Treatment Plant (MPTP) National Priorities List (NPL) sites. These units are part of the Silver Bow Creek/Butte Area NPL under the Federal Superfund Program. The Clark Tailings/Old Landfill Controlled Groundwater Area



is located in the southwest quadrant of the Butte urban area and encompasses the Old Landfill site as well as the adjacent area where the Clark Smelter operated. Heavy metals from the Clark Smelter as well as contaminants from the Old Landfill site contaminated groundwater in the area.

The BABCGWA, or Controlled Groundwater Area (CGWA) identified numerous uses for private wells installed within its boundary that include those used for domestic (potable water), irrigation, industrial, and monitoring. New domestic water wells have been prohibited in Butte since 1992 per 13.20.210 - Mandatory Connection Requirements—Exceptions—Use of wells—Enforcement for residences within 300 feet of a municipal water line (Butte-Silver Bow County Code of Ordinances available at [https://library.municode.com/mt/butte-silver\\_bow\\_county/codes/code\\_of\\_ordinances?nodeId=TIT13PUUT\\_CH13.20WASYRE\\_ARTI\\_ICOWASYRE\\_13.20.210MACOREXCSEWENF](https://library.municode.com/mt/butte-silver_bow_county/codes/code_of_ordinances?nodeId=TIT13PUUT_CH13.20WASYRE_ARTI_ICOWASYRE_13.20.210MACOREXCSEWENF)); however, other types of well installation for irrigation, industrial and monitoring are allowed, following certain conditions. Monitoring wells are excluded from the CGWA provisions, while potable, irrigation, and industrial wells are regulated under the sampling provisions.

A monitoring program has been instituted for private wells within the BABCGWA in order to reduce human and environmental exposure to arsenic, cadmium, copper, lead, and zinc, which is a subset of the COCs defined in Table 8-1 of the U.S. Environmental Protection Agency (EPA) 2006 Record of Decision (ROD). Mercury will also be added to the analyte list to ensure well owner/use safety. Previously collected private well samples have shown that all COCs are within state of Montana human health standards (arsenic 0.010 milligrams per Liter [mg/L], cadmium 0.005 mg/L, copper 1.3 mg/L, lead 0.015 mg/L, mercury 0.002 mg/L, and zinc 2.0 mg/L). However, notwithstanding the new well ban instituted in Butte in 1992, and the establishment of a CGWA in 2009, pre-existing private wells are present within the BABCGWA. Therefore continuation and expansion of the well sampling program along with administrating and enforcing water use restrictions associated with the BABCGWA are required. Details on these programs are provided below.

## **2.1 Proposed Expansion of BABCGWA Domestic Well Sampling Program**

Due to these existing private wells within the BABCGWA, it has been determined that an expansion of the domestic well sampling program is necessary. The goals of both the CGWA and the Butte-Silver Bow WQD are to prevent the migration of existing contamination and prevent human health exposure to contaminated groundwater through the expansion of the domestic well sampling program. In order to meet these goals, a sampling program that incorporates wells used for the following purposes needs to be included:

- Potable Water Supply
- Irrigation Use
- Commercial Use
- Industrial Use
- Unused/Other (no use specified on well log)

Using information contained in the Montana Bureau of Mines and Geology (MBMG) Groundwater Information Center (GWIC) database, a list of wells meeting the above criteria



were identified within the CGWA and BPSOU-TI boundaries, with a quarter mile buffer zone. In total, 105 wells were identified; included in this group of wells are the 9 wells (now 7 due to wellhead pump/electrical issues) currently sampled as part of the CGWA and 14 wells identified during a 2014 BPS-TI sampling event. According to GWIC, the number of wells in the above described categories are as follows:

- Domestic (potable) use: 65
- Irrigation use: 27
- Industrial/Commercial use: 7
- Unknown use: 6

An implementation plan is needed for the expansion of the domestic well sampling program. An appropriate initial step is to conduct site visits or mailings to property owners to determine well usage. The Butte-Silver Bow WQD has worked with MBMG to develop outreach mailers that will be sent to all property owners identified in the GWIC database. Potable wells shall be sampled on an annual basis in order to prevent human health exposure to contaminated groundwater. Non-potable wells (such as irrigation wells) shall be sampled on a 5-year sampling cycle following the initial well sampling. An annual search of GWIC will be performed to identify any new wells installed within the program area, and any wells found that meet the project criteria will be added to the sample list.

During previous meetings with EPA and Montana Department of Environmental Quality (DEQ) it was decided the Anaconda Regional Water, Waste, and Soils (ARWW&S) Operable Unit sampling protocols with some modifications would be a suitable approach and provide consistency between Clark Fork River operable units. Using that guidance, along with typical response rates from direct property mailings, domestic wells (potable) will be sampled yearly (65 wells) while industrial (7 wells), irrigation (27 wells), and wells of unknown use (6 wells) will be sampled every 5 years. Depending on well usage, these frequencies may be modified in the future. If the maximum contaminant level (MCL) is exceeded for any COC in a domestic well sample, a verification sample will be collected as outlined in the CGWA, and if an exceedance is confirmed, the well will be discontinued from use and an alternative water supply provided to the residence as outlined in the CGWA guidelines. Any well whose sample results are less than one-half the MCL for 3 successive sample periods (with required agency approval), will be released from the sampling program. Additional details on well sampling procedures and requirements within the BABCGWA are provided in the MBMG Quality Assurance Project Plan, Butte Mine Flooding Operable Unit and Butte Priority Soils Operable Unit (2019).

### **3.0 Administering and Enforcing BABCGWA Water Use Restrictions**

Through the initial determination of well use and sampling it is possible that wells may be identified as suitable for abandonment. The implementation of a well abandonment program will be dependent upon the findings of the expansion of the domestic well sampling program. Specifics of the well abandonment program, including its mandatory water service systems connection provisions, exceptions, and enforcement mechanisms, are detailed in Section 13.20.210 of the Butte-Silver Bow County Code of Ordinances available at <https://library.municode.com/mt/butte->



silver\_bow\_county/codes/code\_of\_ordinances?nodeId=TIT13PUUT\_CH13.20WASYRE\_ARTI\_ICOWASYRE\_13.20.210MACOREXCSEWENF. A water well log report, fully describing all abandonment procedures, shall be submitted to the MBMG GWIC within 60 days of abandoning the well.

The data gathered from the sampling of Butte-area private wells will quantify the concentrations of total metals from domestic wells and dissolved metals in the groundwater from industrial and irrigation wells. Domestic wells with COC concentrations that exceed the drinking-water standards will be re-sampled with samples collected for both total and dissolved metals. If the confirmation samples also exceed the drinking-water standards, an alternative drinking-water source will be provided to the property. Industrial or irrigation wells exceeding drinking-water standards must comply with the use exemption provided in the Final Order Petition for Butte Alluvial and Bedrock Controlled Groundwater Area No. 76G-30043832.

Regarding the data from each well:

- If a domestic well (potable) meets water quality standards, continue monitoring the well on an annual basis (or a frequency to be determined later based on the well usage).
- If a domestic well does not meet water quality standards for total metals, the well will be re-sampled for both total and dissolved metals. If needed, an alternate water supply will be provided (bottled water, filtration system, connection to the municipal water supply).
- If an industrial or irrigation well meets water quality standards, continue monitoring the well on a 5-year cycle (or a frequency to be determined later based on the well usage).



## Appendix D

### Excavation Ordinance/Protocols

Figure 4 shows the Excavation Control District Map. Current excavation and dirt-moving protocols are available from the Butte-Silver Bow County website at <https://co.silverbow.mt.us/>. Search for any of the following:

#### *Excavation ordinance*

*Butte Silver Bow County Excavation and Dirt-Moving Protocols* (<http://mt-butesilverbow2.civicplus.com/DocumentCenter/View/172/Excavation-and-Dirt-Moving-Permit-Appendices?bidId=>). This report contains the BPSOU Detail of Excavation Control District Map.

#### *Excavation & Dirt Moving Permit Application*

*Code of ordinances, municipal codes.* Specifically, Chapter 8.28 Excavation and Dirt Moving at this site: [https://library.municode.com/mt/butte-silver\\_bow\\_county/codes/code\\_of\\_ordinances?nodeId=TIT13PUUT\\_CH13.20WASYRE\\_ARTIVWAUSCO](https://library.municode.com/mt/butte-silver_bow_county/codes/code_of_ordinances?nodeId=TIT13PUUT_CH13.20WASYRE_ARTIVWAUSCO)



## **Appendix E**

### **Stormwater Ordinance/Design Standards**

Current stormwater ordinance and design standards are available from the Butte-Silver Bow County website at <https://co.silverbow.mt.us/>. Search for any of the following (various website links are also listed):

*Ordinance 10-13, Regulations for Control and Management of Storm Water* (available at <http://mt-butt silverbow2.civicplus.com/DocumentCenter/View/89/Ordinance-10-13-Regulations-for-Control-and-Management-of-Storm-Water?bidId=>)

*Stormwater Engineering Standards (Municipal Storm Water Engineering Standards* (available at <https://co.silverbow.mt.us/176/Metro-Sewer-Stormwater-Services>).

*Stormwater Management Permit Application Form -* (available at <http://mt-butt silverbow2.civicplus.com/DocumentCenter/View/87/Stormwater-Management-Permit-Application-Form?bidId=>).



## **Appendix F**

# **Community Protection Measures Program Plan**



## COMMUNITY PROTECTIVE MEASURES PROGRAM PLAN

### 1. Introduction

The Butte Priority Soils Operable Unit (BPSOU) was the site of historical ore mining, milling, and/or smelting activities from the 1870s through 1982. Since 1982, active mining and milling activities are still occurring within the active mine area, generally northwest of the city of Butte, Montana. Historical mining activity dispersed tailings, waste, smelter emissions, and dust into the environment, resulting in elevated concentrations of contaminants of concern (COCs) in soil, dust, and water. The U.S. Environmental Protection Agency (EPA) has identified arsenic, lead and mercury as the primary COCs in soil and dust within the BPSOU. These COCs, and the potential risks associated with them, have been the subject of study and remediation by EPA since the 1980s. Remedial action levels, established by EPA for residential, commercial/ industrial, and recreational soils and dust are listed in Table 1. These action levels apply to all properties within the BPSOU and 2020 Residential Metals Abatement Program (RMAP) Expanded Area, as described herein.

**Table 1. Soil, Dust, Backfill, and Vapor Action Levels**

Contaminant of Concern	Exposure Scenario	Concentration
Lead	Residential	1,200 mg/kg
	Non-Residential	2,300 mg/kg
Arsenic	Residential	250 mg/kg
	Commercial	500 mg/kg
	Recreational	1,000 mg/kg
Mercury	Residential	147 mg/kg
	Residential (vapor)	0.43 µg/m <sup>3</sup>

mg/kg: milligrams per kilogram. µg/m<sup>3</sup>: micrograms per cubic meter.

As a result of the potential risks associated with elevated COCs, remedial actions may have already been implemented at a property or may be necessary or recommended in the future, either in conjunction with residential or commercial development or based on remedial sample results. The purpose of the remediation is to protect human health and the environment primarily through reduction of exposure to arsenic and lead to below the established remedial action cleanup levels for the specified use.

The EPA 2006 Record of Decision (ROD) for BPSOU required implementation by the Atlantic Richfield Company and Butte Silver Bow County (BSB) of a RMAP to sample, assess, and abate COC contamination in residential properties within and adjacent to BPSOU. The EPA 2020 ROD Amendment describes the recent expansion of the program. The selected remedy requires implementation of awareness and education programs to further protect the Butte community. This Community Protective Measures Program (CPMP) Plan sets forth Atlantic Richfield's and BSB's specific responsibilities with respect to the coordination, implementation and



management of the CPMP and is intended to operate in conjunction with the RMAP Plan and the Institutional Controls Implementation and Assurance Plan (ICIAP) for the BPSOU site.

## **2. Components**

The CPMP responsibilities are comprised of the following components each of which will be implemented and managed by Atlantic Richfield, or as allocated and agreed by BSB, or their respective contractor(s):

- Community Outreach
- Community Awareness and Education
- Public Inquiries
- Geographic Information System (GIS)

Each of the above CPMP components as well as the Atlantic Richfield and BSB specific responsibilities and obligations with respect to each are addressed below.

## **3. Community Outreach**

The primary purpose of the CPMP is to provide community outreach and education to residents within and adjacent to BPSOU on how to reduce the risks of exposure to residual waste. The CPMP's outreach will include a multi-media effort to connect with residents of all ages and demographics. This effort will include the use of print media, flyers, radio spots, presentations at group meetings, booths at civic events, social media, and website notifications among other methods. Target populations include:

- Homeowners
- Families with Young Children
- Realtors
- Medical Professionals
- Daycares
- Contractors
- Renovators
- Schools
- Lenders
- Civic Groups

## **4. Community Awareness and Education**

While the Public Outreach component of the CPMP provides the access to residents, the Community Awareness and Education component provides the education and information needed to ensure that citizens make good decisions in regard to their interaction with residual waste. Through the CPMP Program, BSB will provide information regarding existing



environmental sampling results, remedial actions taken or planned, protectiveness rationale of remedies and action levels, information and referrals regarding applicable permit requirements, and information regarding methods for reducing exposure including best practices for personal/home hygiene and diet, for renovation and demolition, and for food gardens and play areas.

The Program shall provide a range of education components to enhance and maintain the community's awareness of potential sources of and risks from arsenic, lead and/or mercury in and around homes and commercial properties, as well as approaches residents can take to avoid exposures. The educational components include the distribution of educational materials to local contractors (e.g., electricians, roofers, carpenters), hardware/lumber suppliers, childcare facilities/programs (e.g., Head Start), and housing authorities (e.g., Human Resource Council – Section 8 and Low Income Energy Assistance Program [LIEAP]). Informative presentations are available for real estate agents and property owners. Periodic mailings to property owners and public service announcements aired by the local television station are also designed to provide public awareness. Outreach will also rely on the medical community, particularly pediatricians and the Women, Infant, and Children (WIC) program to inform the public about risk, health monitoring, and the Programs activities. The Program also includes participation in community health fairs and family fairs to provide outreach to the community.

The education and outreach component specifically addresses portions of homes and commercial buildings that pose a risk for potential exposure. Such portions addressed are the attic space (if an exposure pathway exists), interior living space, and exterior yard areas. The Program shall rely on educational materials and face-to-face consultations to ensure that homeowners, remodeling contractors, developers, home inspectors, potential buyers, and weatherization workers are aware of the following:

1. The potential presence of lead, arsenic, and/or mercury in attics or earthen basements.
2. The importance of restricting access to those areas by sensitive populations and taking the appropriate measures to ensure that dust is not tracked into the interior living space when infrequent access occurs.
3. The proper contact information prior to implementing any remodeling project and/or landscaping project to ensure that dust and soil are appropriately handled and disposed of by a responsible entity and/or by approved contractors.

Educational materials shall be provided to all Program participants at the time when an environmental assessment of the home is implemented (whether interior or exterior) as well as when applicable building permits are sought for remodeling projects. Recommendations made to each resident will be based on the results of environmental sampling at their homes and specific information collected by Program staff regarding daily habits and activities. See Attachment A for examples of program fact sheets and other educational materials.

The awareness and education materials will be available through BSB's community outreach activities and the GIS. With assistance and input from EPA and the State, the existing awareness and education materials will be updated, and new materials created, as necessary.



## **5. Public Inquiries**

Through the Public Inquiries component, BSB will respond to questions or other inquiries from residents within or adjacent to BPSOU if related to the RMAP program abatement activities. The process may include providing information and guidance on residual wastes; property assessments related to soil, dust, and/or domestic well conditions; referral to additional resources, sampling, and potential remediation; or providing programmatic control services (e.g., materials handling, interior dust, or soil swap).

## **6. Geographic Information System**

The GIS component of the CPMP is a computer-based tool that will have both geographic information functionality and institutional controls management functionality. The geographic information functionality will utilize spatial data for mapping, analyzing, and storing data for properties within the Site (e.g., aerial photos and information regarding property ownership, restrictive covenants, remedial actions, environmental sampling data and "as built" details). The data available through the geographic information functionality will be updated and maintained by BSB in accordance with Section 3.3.2 of the ICIAP. The CPMP functionality will include various web-based tools designed to facilitate implementation of this CPMP Plan by BSB by making certain Site information available to members of the public and tracking public outreach activities.



**CPMP Attachment A**  
(CPMP Fact Sheets and Educational Flyers)



## SOIL SAMPLING AND CLEANUP ACTIVITIES



As you may be aware, Butte Silver Bow County (BSB), the Atlantic Richfield Company, United States Environmental Protection Agency (EPA) and the Montana Department of Environmental Quality (DEQ) have been working actively in the Butte community and surrounding areas to ensure that soil arsenic, lead and mercury concentrations are below applicable action levels. This fact sheet is intended to provide you with information about the action levels and associated soil sampling and cleanup activities in and around Butte.

The EPA developed action levels for Butte and the surrounding areas (see the table below and Figure 2 provided in the ICIAP) to identify when remedial action is necessary. The action levels are based on detailed site-specific health studies and EPA has determined the action levels are protective of human health.

**Table 1. Soil, Dust, Backfill, and Vapor Action Levels**

Contaminant of Concern	Exposure Scenario	Concentration
<b>Lead</b>	<b>Residential</b>	<b>1,200 mg/kg</b>
	<b>Non-Residential</b>	<b>2,300 mg/kg</b>
<b>Arsenic</b>	<b>Residential</b>	<b>250 mg/kg</b>
	<b>Commercial</b>	<b>500 mg/kg</b>
	<b>Recreational</b>	<b>1,000 mg/kg</b>
<b>Mercury</b>	Residential	147 mg/kg
	Residential (vapor)	0.43 $\mu\text{g}/\text{m}^3$

mg/kg: milligrams per kilogram.  $\mu\text{g}/\text{m}^3$ : micrograms per cubic meter.

If you are unsure if your property has been sampled, contact BSB's Superfund Program at (406) 497-5040. If you need to leave a voicemail, include your name, address and contact information. If your property has been sampled, results can be provided for your property upon request. If your property has not been sampled or your property has been sampled and certain eligibility requirements are met, BSB will collect soil and dust samples on your property upon request. You will be asked to sign an access agreement to authorize the sampling. If sample results show that the applicable arsenic/lead/mercury action levels are exceeded, a cleanup plan will be developed and cleanup will be completed. In general, cleanup activities include treatment or removal of impacted soils, and revegetation.





## **RESIDENTIAL ATTIC AND INTERIOR DUST SAMPLING AND CLEANUP ACTIVITIES**

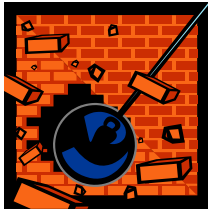
As you may be aware, Butte Silver Bow County (BSB), the Atlantic Richfield Company, United States Environmental Protection Agency (EPA) and the Montana Department of Environmental Quality (DEQ) have been working actively in the Butte community and surrounding areas to ensure that arsenic and or lead concentrations in interior living space and attic dust are below EPA applicable action levels. This fact sheet is intended to provide you with information about the action levels and associated dust sampling and cleanup activities in and around Butte.

The EPA developed action levels for Butte and the surrounding areas (see Figure 1) to identify when remedial action is necessary. The EPA established applicable action levels for arsenic, lead and mercury in accessible attic and interior dust are 250 mg/kg, 1,200 mg/kg, and 147 mg/kg, respectively. The action levels are based on detailed site-specific health studies in Butte and surrounding areas and EPA has determined that action levels are considered protective of human health.

Subject to certain eligibility requirements, sampling of attic dust will be initiated upon request from the landowner.

If you are unsure if your attic has been sampled or if your attic meets the eligibility requirements, contact BSB's Superfund Program at (406) 497-5040. If you need to leave a voicemail, include your name, address, and contact information. You will be asked to sign an access agreement to authorize the sampling. If your attic has been sampled, results can be provided for your property upon request. If your attic dust is sampled and sample results show that the applicable arsenic/lead action levels are exceeded, a cleanup plan will be developed and cleanup will be completed.





## **DEMOLITION AND REMODELING**

Butte Silver Bow County (BSB) requires a demolition permit for demolition and a building permit for certain remodeling activities. When workers are demolishing or remodeling buildings within Butte and the surrounding area (see Figure 1), there is a potential for exposure to arsenic or lead above the applicable action levels particularly if the renovation impacts attics. As part of the demolition or remodeling process, existing sample results can be obtained from BSB.

To mitigate the potential exposure to arsenic or lead during demolition or remodeling, the following Best Management Practices can be employed.

### **Recommended Demolition Best Management Practices**

- Wear masks to reduce or filter inhalation of dust.
- Wear coveralls and hats to reduce skin and hair contact.
- Remove and leave coveralls and hats before leaving demolition area.
- Wash hands before eating or drinking.
- Conduct demolition only in calm or light wind conditions to prevent dust dispersal.
- Where practicable wet-down structures before, during and after demolition, and wet-down debris when loading for transport away from the site.
- Cover loads leaving the site.

### **Recommended Remodeling Best Management Practices**

- Wear masks to reduce or filter inhalation of dust.
- Wear coveralls and hats to reduce skin and hair contact.
- Remove and leave coveralls and hats before leaving remodeling area.
- Wash hands before eating or drinking.
- Remove area rugs and furniture from affected rooms before remodeling.
- Completely cover wall to wall carpeting with protective sheeting or plastic.
- Cover doors, vents, and cabinets with plastic sheeting to prevent migration.

If you have concerns or questions regarding demolition or remodeling activities, you can contact the BSB Superfund Program by phone at (406) 497-5040 or BSB Building Codes Division at 497-6210. If you need to leave a voicemail, include your name, address, and contact information.



## **WHERE CAN I GET MORE INFORMATION ABOUT SUPERFUND?**

- Butte-Silver Bow Superfund Program: <http://www.co.silverbow.mt.us/417/Superfund-Division>.
- Atlantic Richfield Company: [ARMontana.com](http://ARMontana.com).
- United States Environmental Protection Agency (EPA) Region 8: <https://www.epa.gov/region8/superfund-sites-region-8>.
- Montana Department of Environmental Quality (DEQ): <http://deq.mt.gov/Land/FedSuperfund>.
- Montana Technical University Library: <https://www.mtech.edu/library/>.
- Citizen's Technical Environmental Committee (CTEC): <http://www.buttectec.org/>.



# The Residential Metals Program

## Superfund Activities

**FREE**

### Free Soil and Dust Sampling for Property Owners

Fill out a Sample Request form and return it

Contact us to schedule attic and/or indoor dust sampling

Soil sampling can be done upon receiving a Sample Request form or at a scheduled date and time (weather permitting)

Samples are analyzed by a certified lab for lead, arsenic, and mercury

Contamination cleaned-up free of charge

For More Details . . . . .



**497-5040**  
**Butte-Silver Bow Health Dept.**  
**25 W. Front St.**  
**Butte, MT 59701**





# FACT SHEET

## EPA and HUD Move to Protect Children from Lead-Based Paint Poisoning; Disclosure of Lead-Based Paint Hazards in Housing

### SUMMARY

The Environmental Protection Agency (EPA) and the Department of Housing and Urban Development (HUD) are announcing efforts to ensure that the public receives the information necessary to prevent lead poisoning in homes that may contain lead-based paint hazards. Beginning this fall, most home buyers and renters will receive known information on lead-based paint and lead-based paint hazards during sales and rentals of housing built before 1978. Buyers and renters will receive specific information on lead-based paint in the housing as well as a Federal pamphlet with practical, low-cost tips on identifying and controlling lead-based paint hazards. Sellers, landlords, and their agents will be responsible for providing this information to the buyer or renter before sale or lease.

### LEAD-BASED PAINT IN HOUSING

Approximately three-quarters of the nation's housing stock built before 1978 (approximately 64 million dwellings) contains some lead-based paint. When properly maintained and managed, this paint poses little risk. However, 1.7 million children have blood-lead levels above safe limits, mostly due to exposure to lead-based paint hazards.

### EFFECTS OF LEAD POISONING

Lead poisoning can cause permanent damage to the brain and many other organs and causes reduced intelligence and behavioral problems. Lead can also cause abnormal fetal development in pregnant women.

### BACKGROUND

To protect families from exposure to lead from paint, dust, and soil, Congress passed the Residential Lead-Based Paint Hazard Reduction Act of 1992, also

known as Title X. Section 1018 of this law directed HUD and EPA to require the disclosure of known information on lead-based paint and lead-based paint hazards before the sale or lease of most housing built before 1978.

### WHAT IS REQUIRED

Before ratification of a contract for housing sale or lease:

- Sellers and landlords must disclose known lead-based paint and lead-based paint hazards and provide available reports to buyers or renters.
- Sellers and landlords must give buyers and renters the pamphlet, developed by EPA, HUD, and the Consumer Product Safety Commission (CPSC), titled *Protect Your Family from Lead in Your Home*.
- Home buyers will get a 10-day period to conduct a lead-based paint inspection or risk assessment at their own expense. The rule gives the two parties flexibility to negotiate key terms of the evaluation.
- Sales contracts and leasing agreements must include certain notification and disclosure language.
- Sellers, lessors, and real estate agents share responsibility for ensuring compliance.





**WHAT IS NOT REQUIRED**

- This rule does not require any testing or removal of lead-based paint by sellers or landlords.
- This rule does not invalidate leasing and sales contracts.

**TYPE OF HOUSING COVERED**

Most private housing, public housing, Federally owned housing, and housing receiving Federal assistance are affected by this rule.

**TYPE OF HOUSING NOT COVERED**

- Housing built after 1977 (Congress chose not to cover post-1977 housing because the CPSC banned the use of lead-based paint for residential use in 1978).
- Zero-bedroom units, such as efficiencies, lofts, and dormitories.
- Leases for less than 100 days, such as vacation houses or short-term rentals.
- Housing for the elderly (unless children live there).
- Housing for the handicapped (unless children live there).

- Rental housing that has been inspected by a certified inspector and found to be free of lead-based paint.
- Foreclosure sales.

**EFFECTIVE DATES**

- For owners of more than 4 dwelling units, the effective date is September 6, 1996.
- For owners of 4 or fewer dwelling units, the effective date is December 6, 1996.

**THOSE AFFECTED**

The rule will help inform about 9 million renters and 3 million home buyers each year. The estimated cost associated with learning about the requirements, obtaining the pamphlet and other materials, and conducting disclosure activities is about \$6 per transaction.

**EFFECT ON STATES AND LOCAL GOVERNMENTS**

This rule should not impose additional burdens on states since it is a Federally administered and enforced requirement. Some state laws and regulations require the disclosure of lead hazards in housing. The Federal regulations will act as a complement to existing state requirements.

**FOR MORE INFORMATION**

- For a copy of *Protect Your Family from Lead in Your Home* (in English or Spanish), the sample disclosure forms, or the rule, call the National Lead Information Clearinghouse (NLIC) at (800) 424-LEAD, or TDD (800) 526-5456 for the hearing impaired. You may also send your request by fax to (202) 659-1192 or by Internet E-mail to [ehc@cais.com](mailto:ehc@cais.com). Visit the NLIC on the Internet at <http://www.nsc.org/nsc/ehc/ehc.html>.
- Bulk copies of the pamphlet are available from the Government Printing Office (GPO) at (202) 512-1800. Refer to the complete title or GPO stock number 055-000-00507-9. The price is \$26.00 for a pack of 50 copies. Alternatively, persons may reproduce the pamphlet, for use or distribution, if the text and graphics are reproduced in full. Camera-ready copies of the pamphlet are available from the National Lead Information Clearinghouse.
- For specific questions about lead-based paint and lead-based paint hazards, call the National Lead Information Clearinghouse at (800) 424-LEAD, or TDD (800) 526-5456 for the hearing impaired.
- The EPA pamphlet and rule are available electronically and may be accessed through the Internet.

**Electronic Access:**

**Gopher:** [gopher.epa.gov:70/11/Offices/PestPreventToxic/Toxic/lead\\_pm](http://gopher.epa.gov:70/11/Offices/PestPreventToxic/Toxic/lead_pm)

**WWW:** <http://www.epa.gov/opptintr/lead/index.html>  
<http://www.hud.gov>

**Dial up:** (919) 558-0335

**FTP:** [ftp.epa.gov](ftp://ftp.epa.gov) (To login, type "anonymous." Your password is your Internet E-mail address.)



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# **EPA and HUD Real Estate Notification and Disclosure Rule Questions and Answers**

## **The Rule**

### **What is the purpose of this rule and who is affected?**

To protect the public from exposure to lead from paint, dust, and soil, Congress passed the Residential Lead-Based Paint Hazard Reduction Act of 1992, also known as Title X. Section 1018 of this law directed HUD and EPA to require disclosure of information on lead-based paint and lead-based paint hazards before the sale or lease of most housing built before 1978. The rule would ensure that purchasers and renters of housing built before 1978 receive the information necessary to protect themselves and their families from lead-based paint hazards.

### **When does the rule take effect?**

The rule's effective date depends on the number of housing units owned.

! For owners of more than 4 dwelling units, the effective date is September 6, 1996.

! For owners of 4 or fewer dwelling units, the effective date is December 6, 1996.

## **Affected Housing**

### **What type of housing is affected by this rule?**

This rule applies to all housing defined as target housing, which includes most private housing, public housing, housing receiving federal assistance, and federally owned housing built before 1978.

### **What type of housing is not affected by this rule?**

Housing that is not affected by this rule includes:

! 0-bedroom dwellings, such as lofts, efficiencies, and studios.

! Leases of dwelling units of 100 days or fewer, such as vacation homes or short-term rentals.

! Designated housing for the elderly and the handicapped unless children reside or are expected to reside there.

! Rental housing that has been inspected by a certified inspector and is found to be free of



lead-based paint.

### **How does this rule apply to housing common areas such as stairwells, lobbies, and laundry rooms?**

Common areas are those areas in multifamily housing structures that are used or are accessible to all occupants. The rule requires that sellers and lessors disclose available lead information about common areas so that families can be informed about preventive actions.

### **Why doesn't this rule affect housing built after 1978?**

Congress did not extend the law to housing built after 1978 because the Consumer Product Safety Commission banned the use of lead-based paint in housing in 1978.

### **Is my home unsafe if it contains lead-based paint?**

Approximately three-quarters of the nation's housing built before 1978 contains some lead-based paint. This paint, if properly managed and maintained, poses little risk. If allowed to deteriorate, lead from paint can threaten the health of occupants, especially children under 6 years old. If families and building owners are aware of the presence of lead-based paint and the proper actions to take, most lead-based paint hazards can be managed. The EPA pamphlet *Protect Your Family From Lead in Your Home* provides important information for families and home owners to help them identify when lead-based paint is likely to be a hazard and how to get their home checked.

## **Seller & Lessor Responsibilities**

### **What if I'm selling target housing?**

Property owners who sell target housing must:

- ! Disclose all known lead-based paint and lead-based paint hazards in the housing and any available reports on lead in the housing.
- ! Give buyers the EPA pamphlet *Protect Your Family from Lead in Your Home*.
- ! Include certain warning language in the contract as well as signed statements from all parties verifying that all requirements were completed.
- ! Retain signed acknowledgments for 3 years, as proof of compliance.
- ! Give buyers a 10-day opportunity to test the housing for lead.

### **What if I'm renting target housing?**

Property owners who rent out target housing must:

- ! Disclose all known lead-based paint and lead-based paint hazards in the home and any available



reports on lead in the housing.

- ! Give renters the EPA pamphlet *Protect Your Family From Lead in Your Home*.
- ! Include certain warning language in the lease as well as signed statements from all parties verifying that all requirements were completed.
- ! Retain signed acknowledgments for 3 years, as proof of compliance.

**Am I required to give the EPA pamphlet *Protect Your Family From Lead in Your Home* to existing tenants?**

No, but when tenants renew their leases, you must give them the pamphlet and any available reports. In other words, you must give them the same information that you are required to provide new tenants.

**What if the buyers/renters don't speak English?**

In cases where the buyer or renter signed a purchase or lease agreement in a language other than English, the rule requires that the disclosure language be provided in the alternate language. The EPA pamphlet *Protect Your Family From Lead in Your Home* is printed in English and Spanish and will be made available to the public. EPA and HUD are considering publishing the pamphlet in other languages as well.

**Must I check my house for lead prior to sale?**

No. The rule does not require that a seller conduct or finance an inspection or risk assessment. The seller, however, is required to provide the buyer a 10-day period to test for lead-based paint or lead-based paint hazards.

**Is the seller required to remove any lead-based paint that is discovered during an inspection?**

No. Nothing in the rule requires a building owner to remove lead-based paint or lead-based paint hazards discovered during an inspection or risk assessment. In addition, the rule does not prevent the two parties from negotiating hazard reduction activities as a contingency of the purchase and sale of the housing.

**What if I know there is lead-based paint in my home?**

If you know there is lead-based paint in your home, you are required to disclose this information to the buyer or renter along with any other available reports on lead.

**What if the lessor knows that there is no lead-based paint in my rental**



## **housing?**

If your rental housing has been found to be free of lead-based paint by a certified inspector, this rule does not apply. However, landlords seeking an exclusion to this rule must use state certified inspectors. If your state does not have a certification program, you may use a certified inspector from another state. In addition, EPA is developing certification requirements for individuals and firms conducting lead-based paint inspections, risk assessments, and abatements.

## **Agent Responsibilities**

### **What are my responsibilities as an agent?**

Agents must ensure that:

- ! Sellers and landlords are made aware of their obligations under this rule.
- ! Sellers and landlords disclose the proper information to lessors, buyers, and tenants.
- ! Sellers give purchasers the opportunity to conduct an inspection.
- ! Lease and sales contracts contain the appropriate notification and disclosure language and proper signatures.

### **What is the responsibility of an agent if the seller or landlord fails to comply with this rule?**

The agent is responsible for informing the seller or lessor of his or her obligations under this rule. In addition, the agent is responsible if the seller or lessor fails to comply. However, an agent is not responsible for information withheld by the seller or lessor.

## **Purchaser & Renter Rights**

### **As a purchaser, am I required to conduct and finance an inspection?**

No. The rule simply ensures that you have the opportunity to test for lead before purchase.

### **Can the inspection/risk assessment period be waived?**

Yes. The inspection or risk assessment period can be lengthened, shortened, or waived by mutual written consent between the purchaser and the seller.

### **If I am renting, do I have the same opportunity to test for lead?**

Under the law, the 10-day inspection period is limited to sales transactions, but nothing prevents



the renter from negotiating with the lessor to allow time for an inspection before rental.

### **Where can I find a qualified professional to conduct an inspection?**

State agencies can provide helpful information for locating qualified professionals in your area. The EPA pamphlet *Protect Your Family From Lead in Your Home* provides the phone numbers of these state agencies. It is important to verify the qualifications of individuals and firms before hiring them.

### **Must inspectors be certified?**

Some cities and states have their own rules concerning inspector certification. These requirements, which may be administered at the state or federal level, may not be in place for several years. Once these requirements are in place, professionals who offer to perform lead-based paint inspections must be certified. The certification requirements that EPA is developing will ensure that inspectors engaged in lead-based paint activities have completed an EPA-certified training program or an EPA-approved state program. Meanwhile, EPA and HUD recommend that people inspect the qualifications and training of individuals and firms before hiring them to conduct risk assessments, inspections, or abatements.

## **Liability**

### **Does this rule increase my liability for future lead poisoning on my property?**

In some cases, disclosure may actually reduce the owner's liability since occupants may be able to prevent exposure from the beginning. Under this rule, however, sellers, landlords, or agents who fail to provide the required notices and information are liable for triple the amount of damages.

### **Are mortgage lenders liable under these rules if the seller or lessor fails to disclose?**

Under the disclosure regulation, the rule does not identify mortgage lenders as liable parties. This rule does not affect other state and federal provisions regarding the obligations and responsibilities of lenders.

### **What if a seller or lessor fails to comply with these regulations?**

A seller, lessor, or agent who fails to give the proper information can be sued for triple the amount of damages. In addition, they may be subject to civil and criminal penalties. Ensuring that disclosure information is given to home buyers and tenants helps all parties avoid misunderstandings before, during, and after sales and leasing agreements.





# Fight **Lead Poisoning** with a Healthy Diet

Lead Poisoning Prevention Tips  
for Families





## Lead and a Healthy Diet

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What You Can Do to Protect Your Child

### Lead's Effects on the Body

Lead is a poisonous metal that our bodies cannot use. Lead poisoning can cause learning, hearing, and behavioral problems, and can harm your child's brain, kidneys, and other organs. Lead in the body stops good minerals such as iron and calcium from working right. Some of these effects may be permanent.



### Lead Awareness and Your Child

Children with lead poisoning usually do not look or act sick. The only way to know if your child has lead poisoning is by getting a blood test.

Ask your doctor or health care provider to test your child under six years of age at least once a year.

## Lead Hazards

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Where is Lead Found?

### Main Sources of Lead

**Lead-based paint** is a hazard if it is peeling, chipping, chalking, or cracking. Even lead-based paint that appears to be undisturbed can be a problem if it is on surfaces that children chew or that get a lot of wear and tear. The older your home is, the more likely it is to contain lead-based paint.

**Contaminated dust** forms when lead paint is dry-scraped or sanded. Dust can also become contaminated when painted surfaces bump or rub together. Lead chips and dust can gather on surfaces and objects that people touch or that children put into their mouths.

Lead poisoning occurs **without** any obvious symptoms and **harms**

  
your child's body.

**Contaminated soil** occurs when exterior lead-based paint from houses, buildings, or other structures flakes or peels and gets into the soil. Soil near roadways may also be contaminated from past use of leaded gasoline in cars. Avoid these areas when planting vegetable gardens.

### Other Sources of Lead

Contaminated drinking water from older plumbing fixtures

Lead-based painted toys and household furniture

Imported lead-glazed pottery and leaded crystal

Lead smelters

Hobbies

Folk remedies like azarcon and pay-loo-ah

Cosmetics like kohl and kajal

Do not store **food** in glazed pottery from foreign countries.







## Tips to help you and your children plan meals and snacks

## Dinner

Sloppy joes  
Watermelon  
Low-fat milk

-or-

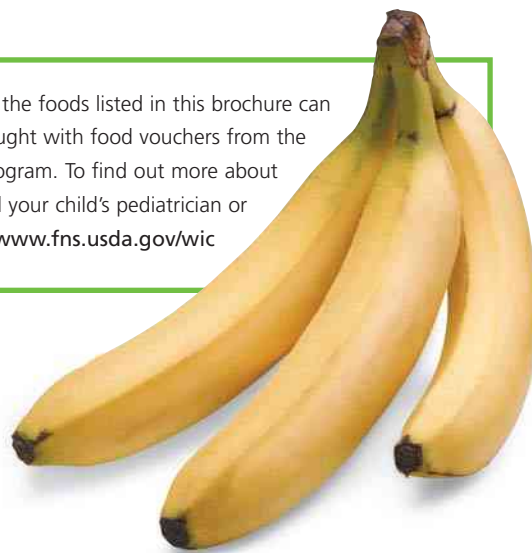
Macaroni and cheese  
Stewed tomatoes  
Melon slice

-or-

Chicken stew  
Rice  
Strawberries

Cereal with low-fat milk, whole wheat crackers with cheese, apple or pear slices, oranges or bananas, raisins, yogurt, frozen fruit juice pops, and fruit smoothies.

Many of the foods listed in this brochure can be bought with food vouchers from the WIC program. To find out more about WIC, call your child's pediatrician or visit [www.fns.usda.gov/wic](http://www.fns.usda.gov/wic)





## Oatmeal Swirls

Case 2:18-cv-00039-BJM Document 1180-1 Filed 08/20/18 Page 1303 of 1422

1 1/2 cups of quick cooking oats  
1/3 cup of peanut butter  
1/3 cup of fruit jelly or jam

### Steps:

- Follow the package directions to cook oats.
- Spoon peanut butter and jelly on top of cooked oatmeal.
- Stir and spoon into bowls.
- Serve with low-fat milk.



## Cheese Omelet • Makes 2–3 servings

3 eggs  
1 tablespoon of low-fat milk  
Vegetable oil  
3 tablespoons of cheese

### Steps:

- Mix eggs and milk in a bowl.
- Lightly coat pan with vegetable oil. Use medium heat.
- Add egg mixture and cook.
- When omelet is cooked on the bottom, add cheese.
- When cheese is melted, fold omelet in half.
- Top with salsa if you like.
- Serve with toast, fruit, and low-fat milk.

## French Toast

Case 2:18-cv-00039-BJM Document 1180-1 Filed 08/20/18 Page 1303 of 1422

3 eggs, beaten  
1/2 cup of low-fat milk  
Vegetable oil  
6 slices of bread  
Cinnamon  
2 bananas, sliced

### Steps:

- Mix eggs and milk.
- Lightly coat pan with vegetable oil. Use medium heat.
- Dip bread into egg mixture, so that bread is covered.
- Brown one side of bread in pan.
- Sprinkle top with cinnamon.
- Turn over bread and brown the other side. Top with sliced banana.
- Serve with low-fat milk.

## Grilled Cheese & Tomato Sandwich • Makes 1 serving

2 slices of bread  
2 slices of American cheese  
1 slice of tomato  
Vegetable oil

### Steps:

- Make sandwich using bread, cheese, and tomato.
- Lightly coat pan with vegetable oil.
- Brown sandwich on both sides over low heat to melt the cheese.
- Serve with low-fat milk or fruit juice.





## Tuna Salad Sandwich

4 slices of bread  
1 can of water packed tuna  
4 teaspoons of low-fat mayonnaise  
Onion and celery, chopped

### Steps:

- Mix tuna with low-fat mayonnaise, onion, and celery.
- Try your sandwich with cheese and tomato.
- Serve with low-fat milk.



## Pizza Bagels • Makes 2–3 servings

1 bagel  
2 tablespoons of tomato sauce  
Garlic, basil, or oregano  
2 tablespoons of cheddar cheese or part-skim mozzarella

### Steps:

- Preheat oven to 400 degrees.
- Slice open a bagel and place on a flat pan.
- Add tomato sauce, seasonings, and cheese.
- Bake for 3 minutes or until cheese melts.
- Serve with fruit juice.

## Sloppy Joes

1 pound of lean ground beef, turkey, or chicken  
1 small onion, chopped  
1/2 green pepper, chopped  
1 cup of tomato sauce  
Your choice of seasonings  
5 hamburger buns or pita pocket breads

### Steps:

- In a pan, cook lean ground meat, onion, and green pepper until meat is well done.
- Drain fat.
- Stir in tomato sauce and seasonings.
- Cook for 5 to 10 minutes.
- Spoon into hamburger bun or pita.
- Serve with fruit juice.



## Baked Macaroni and Cheese • Makes 3–5 servings

4 cups of cooked macaroni  
3 cups of grated cheddar cheese  
2 tablespoons of margarine  
2 tablespoons of flour

Vegetable oil  
2 cups of low-fat milk  
Salt and pepper

### Steps:

- Preheat oven to 375 degrees. Lightly coat casserole dish with vegetable oil.
- Mix cooked macaroni with grated cheese and pour into casserole.
- Melt margarine in a pan. Remove from heat, stir in flour. Return to heat.
- Add low-fat milk slowly, stirring until smooth.
- Season with salt and pepper to taste.
- Pour over macaroni. Stir.
- Cover. Bake for 30 minutes.
- Uncover and bake for another 15 minutes.



3 pounds of frying chicken, cut up into small pieces  
Vegetable oil  
1 medium onion, chopped  
1 stalk of celery, chopped  
28 ounce can of stewed tomatoes  
Poultry seasoning

**Steps:**

- Lightly coat pot with vegetable oil. Use medium heat.
- Cook chicken until it is well done.
- Add can of stewed tomatoes.
- Add vegetables and seasoning.
  - Cover and cook over low heat for 30 minutes.
  - Serve with rice or noodles.



**Banana Strawberry Smoothie** • Makes 2-3 servings

1 cup of low-fat milk  
1 cup of fresh or frozen strawberries, mashed  
1 ripe banana, mashed

**Steps:**

- Mix all together in a blender or use a wire whisk.
- Eat as a snack or for dessert.



trim  
this  
area  
off



trim  
this  
area  
off









## Regularly Eat Healthy Foods

Children with empty stomachs absorb more lead than children with full stomachs. Provide your child with four to six small meals during the day. The following nutrients can help protect your child from lead poisoning:



### **Iron-Rich Foods**

Normal levels of iron work to protect the body from the harmful effects of lead. Good sources of dietary iron include:

*Lean red meats, fish, and chicken*  
*Iron-fortified cereals*  
*Dried fruits (raisins, prunes)*

### **Calcium-Rich Foods**

Calcium reduces lead absorption and also helps make teeth and bones strong. Good sources of dietary calcium include:

*Milk*  
*Yogurt*  
*Cheese*  
*Green leafy vegetables (spinach, kale, collard greens)*



### **Vitamin C-Rich Foods**

Vitamin C and iron-rich foods work together to reduce lead absorption. Good sources of vitamin C include:

*Oranges, orange juice*  
*Grapefruits, grapefruit juice*  
*Tomatoes, tomato juice*  
*Green peppers*

A healthy diet can help

**protect**  
your **child**  
**from the harmful effects**  
**of lead.**





## Simple Steps You Can Take

to Protect Your Family from Lead Hazards

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### If you think your home has high levels of lead:

- Make sure your children eat healthy, low-fat foods high in iron, calcium, and vitamin C.
- Get your children tested for lead, even if they seem healthy.
- Get your home tested for lead if it was built before 1978. Call **1-800-424-LEAD** for more information.
- Always wash your hands before eating.
- Wash children's hands, bottles, pacifiers, and toys.
- Do not use imported pottery to store or serve food.
- Let tap water run for one minute before using.
- Use only cold water for making your baby's formula, drinking, and cooking.
- Regularly clean floors, windowsills, and other surfaces using wet methods that control dust.
- Wipe or remove shoes before entering your house.
- If you rent, it is your landlord's job to keep paint in good shape. Report peeling or chipping paint to your landlord and call your health department if the paint is not repaired safely.
- Take precautions to avoid exposure to lead dust when remodeling or renovating.
- Don't try to remove paint yourself!



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### For more information on childhood lead poisoning prevention:

#### Call

- Your child's pediatrician
- The National Lead Information Center  
**1-800-424-LEAD (424-5323)**
- U.S. Environmental Protection Agency's (EPA) Safe Drinking Water Hotline  
**1-800-426-4791**



#### Visit

- EPA Lead Program Web site  
**[www.epa.gov/lead](http://www.epa.gov/lead)**
- U.S. Centers for Disease Control and Prevention (CDC) Web site  
**[www.cdc.gov/nceh/lead](http://www.cdc.gov/nceh/lead)**
- U.S. Department of Housing and Urban Development (HUD) Web site  
**[www.hud.gov/offices/lead](http://www.hud.gov/offices/lead)**





# THE LEAD-SAFE CERTIFIED GUIDE TO RENOVATE RIGHT



CAUTION CAUTION CAUTION CAUTION CAUTION CAUTION



1-800-424-LEAD (5323)

[epa.gov/getleadsafe](http://epa.gov/getleadsafe)

EPA-740-K-10-001

Revised September 2011



This document may be purchased through the U.S. Government Printing Office online at [bookstore.gpo.gov](http://bookstore.gpo.gov) or by phone (toll-free): 1-866-512-1800.

Important lead hazard information for  
families, child care providers and schools.





## IT'S THE LAW!

Federal law requires contractors that disturb painted surfaces in homes, child care facilities and schools built before 1978 to be certified and follow specific work practices to prevent lead contamination. Always ask to see your contractor's certification.

Federal law requires that individuals receive certain information before renovating more than six square feet of painted surfaces in a room for interior projects or more than twenty square feet of painted surfaces for exterior projects or window replacement or demolition in housing, child care facilities and schools built before 1978.

- Homeowners and tenants: renovators must give you this pamphlet before starting work.
- Child care facilities, including preschools and kindergarten classrooms, and the families of children under six years of age that attend those facilities: renovators must provide a copy of this pamphlet to child care facilities and general renovation information to families whose children attend those facilities.



## WHO SHOULD READ THIS PAMPHLET?

### This pamphlet is for you if you:

- Reside in a home built before 1978.
- Own or operate a child care facility, including preschools and kindergarten classrooms, built before 1978, or
- Have a child under six years of age who attends a child care facility built before 1978.

### You will learn:

- Basic facts about lead and your health.
- How to choose a contractor, if you are a property owner.
- What tenants, and parents/guardians of a child in a child care facility or school should consider.
- How to prepare for the renovation or repair job.
- What to look for during the job and after the job is done.
- Where to get more information about lead.

### This pamphlet is not for:

- **Abatement projects.** Abatement is a set of activities aimed specifically at eliminating lead or lead hazards. EPA has regulations for certification and training of abatement professionals. If your goal is to eliminate lead or lead hazards, contact the National Lead Information Center at **1-800-424-LEAD (5323)** for more information.
- **“Do-it-yourself” projects.** If you plan to do renovation work yourself, this document is a good start, but you will need more information to complete the work safely. Call the National Lead Information Center at **1-800-424-LEAD (5323)** and ask for more information on how to work safely in a home with lead-based paint.
- **Contractor education.** Contractors who want information about working safely with lead should contact the National Lead Information Center at **1-800-424-LEAD (5323)** for information about courses and resources on lead-safe work practices.





## RENOVATING, REPAIRING, OR PAINTING?



- Is your home, your building, or the child care facility or school your children attend being renovated, repaired, or painted?
- Was your home, your building, or the child care facility or school where your children under six years of age attend built before 1978?

If the answer to these questions is YES, there are a few important things you need to know about lead-based paint.

This pamphlet provides basic facts about lead and information about lead safety when work is being done in your home, your building or the child care facility or school your children attend.

### The Facts About Lead

- Lead can affect children's brains and developing nervous systems, causing reduced IQ, learning disabilities, and behavioral problems. Lead is also harmful to adults.
- Lead in dust is the most common way people are exposed to lead. People can also get lead in their bodies from lead in soil or paint chips. Lead dust is often invisible.
- Lead-based paint was used in more than 38 million homes until it was banned for residential use in 1978.
- Projects that disturb painted surfaces can create dust and endanger you and your family. Don't let this happen to you. Follow the practices described in this pamphlet to protect you and your family.

## LEAD AND YOUR HEALTH

### Lead is especially dangerous to children under six years of age.

Lead can affect children's brains and developing nervous systems, causing:

- Reduced IQ and learning disabilities.
- Behavior problems.

### Even children who appear healthy can have dangerous levels of lead in their bodies.

Lead is also harmful to adults. In adults, low levels of lead can pose many dangers, including:

- High blood pressure and hypertension.
- Pregnant women exposed to lead can transfer lead to their fetuses. Lead gets into the body when it is swallowed or inhaled.
- People, especially children, can swallow lead dust as they eat, play, and do other normal hand-to-mouth activities.
- People may also breathe in lead dust or fumes if they disturb lead-based paint. People who sand, scrape, burn, brush, blast or otherwise disturb lead-based paint risk unsafe exposure to lead.



### What should I do if I am concerned about my family's exposure to lead?

- A blood test is the only way to find out if you or a family member already has lead poisoning. Call your doctor or local health department to arrange for a blood test.
- Call your local health department for advice on reducing and eliminating exposures to lead inside and outside your home, child care facility or school.
- Always use lead-safe work practices when renovation or repair will disturb painted surfaces.

For more information about the health effects of exposure to lead, visit the EPA lead website at [epa.gov/lead/pubs/leadinfo](http://epa.gov/lead/pubs/leadinfo) or call 1-800-424-LEAD (5323).

### There are other things you can do to protect your family every day.

- Regularly clean floors, window sills, and other surfaces.
- Wash children's hands, bottles, pacifiers, and toys often.
- Make sure children eat a healthy, nutritious diet consistent with the USDA's dietary guidelines, that helps protect children from the effects of lead.
- Wipe off shoes before entering the house.



## WHERE DOES THE LEAD COME FROM?

### Dust is the main problem.

The most common way to get lead in the body is from dust. Lead dust comes from deteriorating lead-based paint and lead-contaminated soil that gets tracked into your home. This dust may accumulate to unsafe levels. Then, normal hand-to-mouth activities, like playing and eating (especially in young children), move that dust from surfaces like floors and window sills into the body.

### Home renovation creates dust.

Common renovation activities like sanding, cutting, and demolition can create hazardous lead dust and chips.

### Proper work practices protect you from the dust.

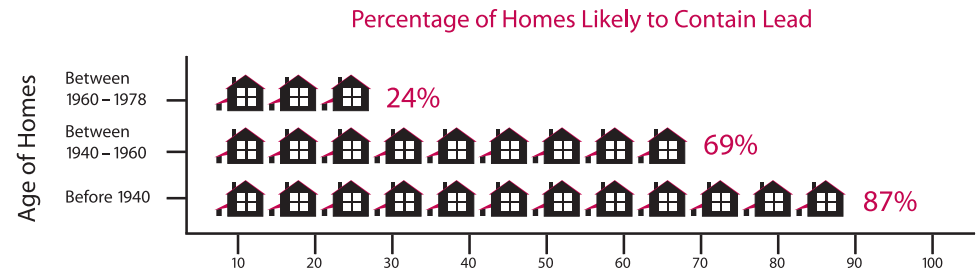
The key to protecting yourself and your family during a renovation, repair or painting job is to use lead-safe work practices such as containing dust inside the work area, using dust-minimizing work methods, and conducting a careful cleanup, as described in this pamphlet.

### Other sources of lead.

Remember, lead can also come from outside soil, your water, or household items (such as lead-glazed pottery and lead crystal). Contact the National Lead Information Center at 1-800-424-LEAD (5323) for more information on these sources.



## CHECKING YOUR HOME FOR LEAD-BASED PAINT



### Older homes, child care facilities, and schools are more likely to contain lead-based paint.

Homes may be single-family homes or apartments. They may be private, government-assisted, or public housing. Schools are preschools and kindergarten classrooms. They may be urban, suburban, or rural.

### You have the following options:

#### You may decide to assume your home, child care facility, or school contains lead.

Especially in older homes and buildings, you may simply want to assume lead-based paint is present and follow the lead-safe work practices described in this brochure during the renovation, repair, or painting job.

#### You can hire a certified professional to check for lead-based paint.

These professionals are certified risk assessors or inspectors, and can determine if your home has lead or lead hazards.

- A certified inspector or risk assessor can conduct an inspection telling you whether your home, or a portion of your home, has lead-based paint and where it is located. This will tell you the areas in your home where lead-safe work practices are needed.
- A certified risk assessor can conduct a risk assessment telling you if your home currently has any lead hazards from lead in paint, dust, or soil. The risk assessor can also tell you what actions to take to address any hazards.
- For help finding a certified risk assessor or inspector, call the National Lead Information Center at 1-800-424-LEAD (5323).

You may also have a certified renovator test the surfaces or components being disturbed for lead by using a lead test kit or by taking paint chip samples and sending them to an EPA-recognized testing laboratory. Test kits must be EPA-recognized and are available at hardware stores. They include detailed instructions for their use.



## FOR PROPERTY OWNERS

### **You have the ultimate responsibility for the safety of your family, tenants, or children in your care.**

This means properly preparing for the renovation and keeping persons out of the work area (see p. 8). It also means ensuring the contractor uses lead-safe work practices.

Federal law requires that contractors performing renovation, repair and painting projects that disturb painted surfaces in homes, child care facilities, and schools built before 1978 be certified and follow specific work practices to prevent lead contamination.

### **Make sure your contractor is certified, and can explain clearly the details of the job and how the contractor will minimize lead hazards during the work.**

- You can verify that a contractor is certified by checking EPA's website at [epa.gov/getleadSAFE](http://epa.gov/getleadSAFE) or by calling the National Lead Information Center at 1-800-424-LEAD (5323). You can also ask to see a copy of the contractor's firm certification.
- Ask if the contractor is trained to perform lead-safe work practices and to see a copy of their training certificate.
- Ask them what lead-safe methods they will use to set up and perform the job in your home, child care facility or school.
- Ask for references from at least three recent jobs involving homes built before 1978, and speak to each personally.

### **Always make sure the contract is clear about how the work will be set up, performed, and cleaned.**

- Share the results of any previous lead tests with the contractor.
- You should specify in the contract that they follow the work practices described on pages 9 and 10 of this brochure.
- The contract should specify which parts of your home are part of the work area and specify which lead-safe work practices will be used in those areas. Remember, your contractor should confine dust and debris to the work area and should minimize spreading that dust to other areas of the home.
- The contract should also specify that the contractor will clean the work area, verify that it was cleaned adequately, and re-clean it if necessary.

### **If you think a worker is not doing what he is supposed to do or is doing something that is unsafe, you should:**

- Direct the contractor to comply with regulatory and contract requirements.
- Call your local health or building department, or
- Call EPA's hotline 1-800-424-LEAD (5323).

If your property receives housing assistance from HUD (or a state or local agency that uses HUD funds), you must follow the requirements of HUD's Lead-Safe Housing Rule and the ones described in this pamphlet.

## FOR TENANTS AND FAMILIES OF CHILDREN UNDER SIX YEARS OF AGE IN CHILD CARE FACILITIES AND SCHOOLS

### **You play an important role ensuring the ultimate safety of your family.**

This means properly preparing for the renovation and staying out of the work area (see p. 8).

Federal law requires that contractors performing renovation, repair and painting projects that disturb painted surfaces in homes built before 1978 and in child care facilities and schools built before 1978, that a child under six years of age visits regularly, to be certified and follow specific work practices to prevent lead contamination.

The law requires anyone hired to renovate, repair, or do painting preparation work on a property built before 1978 to follow the steps described on pages 9 and 10 unless the area where the work will be done contains no lead-based paint.

### **If you think a worker is not doing what he is supposed to do or is doing something that is unsafe, you should:**

- Contact your landlord.
- Call your local health or building department, or
- Call EPA's hotline 1-800-424-LEAD (5323).

If you are concerned about lead hazards left behind after the job is over, you can check the work yourself (see page 10).





## PREPARING FOR A RENOVATION

### The work areas should not be accessible to occupants while the work occurs.

The rooms or areas where work is being done may need to be blocked off or sealed with plastic sheeting to contain any dust that is generated. Therefore, the contained area may not be available to you until the work in that room or area is complete, cleaned thoroughly, and the containment has been removed. Because you may not have access to some areas during the renovation, you should plan accordingly.

### You may need:

- Alternative bedroom, bathroom, and kitchen arrangements if work is occurring in those areas of your home.
- A safe place for pets because they too can be poisoned by lead and can track lead dust into other areas of the home.
- A separate pathway for the contractor from the work area to the outside in order to bring materials in and out of the home. Ideally, it should not be through the same entrance that your family uses.
- A place to store your furniture. All furniture and belongings may have to be moved from the work area while the work is being done. Items that can't be moved, such as cabinets, should be wrapped in plastic.
- To turn off forced-air heating and air conditioning systems while the work is being done. This prevents dust from spreading through vents from the work area to the rest of your home. Consider how this may affect your living arrangements.

You may even want to move out of your home temporarily while all or part of the work is being done.

Child care facilities and schools may want to consider alternative accommodations for children and access to necessary facilities.



## DURING THE WORK

Federal law requires contractors that are hired to perform renovation, repair and painting projects in homes, child care facilities, and schools built before 1978 that disturb painted surfaces to be certified and follow specific work practices to prevent lead contamination.

The work practices the contractor must follow include these three simple procedures, described below:

**1. Contain the work area.** The area must be contained so that dust and debris do not escape from that area. Warning signs must be put up and plastic or other impermeable material and tape must be used as appropriate to:

- Cover the floors and any furniture that cannot be moved.
- Seal off doors and heating and cooling system vents.
- For exterior renovations, cover the ground and, in some instances, erect vertical containment or equivalent extra precautions in containing the work area.

These work practices will help prevent dust or debris from getting outside the work area.

**2. Avoid renovation methods that generate large amounts of lead-contaminated dust.** Some methods generate so much lead-contaminated dust that their use is prohibited.

They are:

- Open flame burning or torching.
- Sanding, grinding, planing, needle gunning, or blasting with power tools and equipment not equipped with a shroud and HEPA vacuum attachment.
- Using a heat gun at temperatures greater than 1100°F.



There is no way to eliminate dust, but some renovation methods make less dust than others. Contractors may choose to use various methods to minimize dust generation, including using water to mist areas before sanding or scraping; scoring paint before separating components; and prying and pulling apart components instead of breaking them.

**3. Clean up thoroughly.** The work area should be cleaned up daily to keep it as clean as possible. When all the work is done, the area must be cleaned up using special cleaning methods before taking down any plastic that isolates the work area from the rest of the home. The special cleaning methods should include:

- Using a HEPA vacuum to clean up dust and debris on all surfaces, followed by
- Wet wiping and wet mopping with plenty of rinse water.

When the final cleaning is done, look around. There should be no dust, paint chips, or debris in the work area. If you see any dust, paint chips, or debris, the area must be re-cleaned.



## FOR PROPERTY OWNERS: AFTER THE WORK IS DONE

When all the work is finished, you will want to know if your home, child care facility, or school where children under six attend has been cleaned up properly.

### EPA Requires Cleaning Verification.

In addition to using allowable work practices and working in a lead-safe manner, EPA's RRP rule requires contractors to follow a specific cleaning protocol. The protocol requires the contractor to use disposable cleaning cloths to wipe the floor and other surfaces of the work area and compare these cloths to an EPA-provided cleaning verification card to determine if the work area was adequately cleaned. EPA research has shown that following the use of lead-safe work practices with the cleaning verification protocol will effectively reduce lead-dust hazards.

### Lead-Dust Testing.

EPA believes that if you use a certified and trained renovation contractor who follows the LRRP rule by using lead-safe work practices and the cleaning protocol after the job is finished, lead-dust hazards will be effectively reduced. If, however, you are interested in having lead-dust testing done at the completion of your job, outlined below is some helpful information.

#### What is a lead-dust test?

- Lead-dust tests are wipe samples sent to a laboratory for analysis. You will get a report specifying the levels of lead found after your specific job.

#### How and when should I ask my contractor about lead-dust testing?

- Contractors are not required by EPA to conduct lead-dust testing. However, if you want testing, EPA recommends testing be conducted by a lead professional. To locate a lead professional who will perform an evaluation near you, visit EPA's website at [epa.gov/lead/pubs/locate](http://epa.gov/lead/pubs/locate) or contact the National Lead Information Center at **1-800-424-LEAD (5323)**.
- If you decide that you want lead-dust testing, it is a good idea to specify in your contract, before the start of the job, that a lead-dust test is to be done for your job and who will do the testing, as well as whether re-cleaning will be required based on the results of the test.
- You may do the testing yourself. If you choose to do the testing, some EPA-recognized lead laboratories will send you a kit that allows you to collect samples and send them back to the laboratory for analysis. Contact the National Lead Information Center for lists of EPA-recognized testing laboratories.



## FOR ADDITIONAL INFORMATION

You may need additional information on how to protect yourself and your children while a job is going on in your home, your building, or child care facility.

The National Lead Information Center at **1-800-424-LEAD (5323)** or [epa.gov/lead/nlic](http://epa.gov/lead/nlic) can tell you how to contact your state, local, and/or tribal programs or get general information about lead poisoning prevention.

- State and tribal lead poisoning prevention or environmental protection programs can provide information about lead regulations and potential sources of financial aid for reducing lead hazards. If your state or local government has requirements more stringent than those described in this pamphlet, you must follow those requirements.
- Local building code officials can tell you the regulations that apply to the renovation work that you are planning.
- State, county, and local health departments can provide information about local programs, including assistance for lead-poisoned children and advice on ways to get your home checked for lead.



The National Lead Information Center can also provide a variety of resource materials, including the following guides to lead-safe work practices. Many of these materials are also available at [epa.gov/lead/pubs/brochure](http://epa.gov/lead/pubs/brochure)

- Steps to Lead Safe Renovation, Repair and Painting.
- Protect Your Family from Lead in Your Home
- Lead in Your Home: A Parent's Reference Guide



For the hearing impaired, call the Federal Information Relay Service at 1-800-877-8339 to access any of the phone numbers in this brochure.



## EPA CONTACTS

### EPA Regional Offices

EPA addresses residential lead hazards through several different regulations. EPA requires training and certification for conducting abatement and renovations, education about hazards associated with renovations, disclosure about known lead paint and lead hazards in housing, and sets lead-paint hazard standards.

Your Regional EPA Office can provide further information regarding lead safety and lead protection programs at [epa.gov/lead](https://epa.gov/lead).

#### Region 1

(Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island, Vermont)  
Regional Lead Contact  
U.S. EPA Region 1  
Suite 1100  
One Congress Street  
Boston, MA 02114-2023  
(888) 372-7341

#### Region 2

(New Jersey, New York, Puerto Rico, Virgin Islands)  
Regional Lead Contact  
U.S. EPA Region 2  
2890 Woodbridge Avenue  
Building 205, Mail Stop 225  
Edison, NJ 08837-3679  
(732) 321-6671

#### Region 3

(Delaware, Maryland, Pennsylvania, Virginia, Washington, DC, West Virginia)  
Regional Lead Contact  
U.S. EPA Region 3  
1650 Arch Street  
Philadelphia, PA  
19103-2029  
(215) 814-5000

#### Region 4

(Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee)  
Regional Lead Contact  
U.S. EPA Region 4  
61 Forsyth Street, SW  
Atlanta, GA 30303-8960  
(404) 562-9900

#### Region 5

(Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin)  
Regional Lead Contact  
U.S. EPA Region 5  
77 West Jackson Boulevard  
Chicago, IL 60604-3507  
(312) 886-6003

#### Region 6

(Arkansas, Louisiana, New Mexico, Oklahoma, Texas)  
Regional Lead Contact  
U.S. EPA Region 6  
1445 Ross Avenue,  
12th Floor  
Dallas, TX 75202-2733  
(214) 665-7577

#### Region 7

(Iowa, Kansas, Missouri, Nebraska)  
Regional Lead Contact  
U.S. EPA Region 7  
901 N. 5th Street  
Kansas City, KS 66101  
(913) 551-7003

#### Region 8

(Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming)  
Regional Lead Contact  
U.S. EPA Region 8  
1595 Wynkoop Street  
Denver, CO 80202  
(303) 312-6312

#### Region 9

(Arizona, California, Hawaii, Nevada)  
Regional Lead Contact  
U.S. Region 9  
75 Hawthorne Street  
San Francisco, CA 94105  
(415) 947-8021

#### Region 10

(Alaska, Idaho, Oregon, Washington)  
Regional Lead Contact  
U.S. EPA Region 10  
1200 Sixth Avenue  
Seattle, WA 98101-1128  
(206) 553-1200

## OTHER FEDERAL AGENCIES

### CPSC

The Consumer Product Safety Commission (CPSC) protects the public from the unreasonable risk of injury or death from 15,000 types of consumer products under the agency's jurisdiction. CPSC warns the public and private sectors to reduce exposure to lead and increase consumer awareness. Contact CPSC for further information regarding regulations and consumer product safety.

### CPSC

4330 East West Highway  
Bethesda, MD 20814  
Hotline 1-(800) 638-2772  
[cpsc.gov](https://cpsc.gov)

### CDC Childhood Lead Poisoning Prevention Branch

The Centers for Disease Control and Prevention (CDC) assists state and local childhood lead poisoning prevention programs to provide a scientific basis for policy decisions, and to ensure that health issues are addressed in decisions about housing and the environment. Contact CDC Childhood Lead Poisoning Prevention Program for additional materials and links on the topic of lead.

### CDC Childhood Lead Poisoning Prevention Branch

4770 Buford Highway, MS F-40  
Atlanta, GA 30341  
(770) 488-3300  
[cdc.gov/nceh/lead](https://cdc.gov/nceh/lead)

### HUD Office of Healthy Homes and Lead Hazard Control

The Department of Housing and Urban Development (HUD) provides funds to state and local governments to develop cost-effective ways to reduce lead-based paint hazards in America's privately-owned low-income housing. In addition, the office enforces the rule on disclosure of known lead paint and lead hazards in housing, and HUD's lead safety regulations in HUD-assisted housing, provides public outreach and technical assistance, and conducts technical studies to help protect children and their families from health and safety hazards in the home. Contact the HUD Office of Healthy Homes and Lead Hazard Control for information on lead regulations, outreach efforts, and lead hazard control research and outreach grant programs.

### U.S. Department of Housing and Urban Development

Office of Healthy Homes and Lead Hazard Control  
451 Seventh Street, SW, Room 8236  
Washington, DC 20410-3000  
HUD's Lead Regulations Hotline  
(202) 402-7698  
[hud.gov/offices/lead/](https://hud.gov/offices/lead/)





## SAMPLE PRE-RENOVATION FORM

This sample form may be used by renovation firms to document compliance with the Federal pre-renovation education and renovation, repair, and painting regulations.

### Occupant Confirmation

Pamphlet Receipt

- ☐ I have received a copy of the lead hazard information pamphlet informing me of the potential risk of the lead hazard exposure from renovation activity to be performed in my dwelling unit. I received this pamphlet before the work began.

Printed Name of Owner-occupant

Signature of Owner-occupant

Signature Date

### Renovator's Self Certification Option (for tenant-occupied dwellings only)

Instructions to Renovator: If the lead hazard information pamphlet was delivered but a tenant signature was not obtainable, you may check the appropriate box below.

- ☐ **Declined** – I certify that I have made a good faith effort to deliver the lead hazard information pamphlet to the rental dwelling unit listed below at the date and time indicated and that the occupant declined to sign the confirmation of receipt. I further certify that I have left a copy of the pamphlet at the unit with the occupant.
- ☐ **Unavailable for signature** – I certify that I have made a good faith effort to deliver the lead hazard information pamphlet to the rental dwelling unit listed below and that the occupant was unavailable to sign the confirmation of receipt. I further certify that I have left a copy of the pamphlet at the unit by sliding it under the door or by (fill in how pamphlet was left).

Printed Name of Person Certifying Delivery

Attempted Delivery Date

Signature of Person Certifying Lead Pamphlet Delivery

Unit Address

**Note Regarding Mailing Option** — As an alternative to delivery in person, you may mail the lead hazard information pamphlet to the owner and/or tenant. Pamphlet must be mailed at least seven days before renovation. Mailing must be documented by a certificate of mailing from the post office.



## Butte-Silver Bow Residential Metals Program

*The Butte-Silver Bow Residential Metals Program is designed to mitigate potentially harmful exposure of residents living within the Butte Priority Soils Operable Unit (BPSOU) and the adjacent areas to sources of lead, arsenic, and mercury.*



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## Butte-Silver Bow Health Department

25 W. Front St.  
Butte, MT 59701

**Phone: 406-497-5040**

**Fax: 406-723-7245**

## Residential Metals Program

### Butte-Silver Bow Health Department



**Tel: 406-497-5040**





# Butte-Silver Bow Residential Metals Program (406) 497-5040

Butte– Silver Bow Health Dept.  
25 W. Front St.  
Butte, MT 59701  
Fax: 406-723-7245

## **FREE Sampling for Property Owners**



**Samples are analyzed for potential Lead, Arsenic, and Mercury contamination due to past mining activity in the area**

- ◆ Property owner completes the sample request form
- ◆ Schedule a time for samples to be collected
- ◆ Attic dust, indoor dust, and soil samples (weather pending) are collected and analyzed by a certified lab
- ◆ Confidential results will be mailed to the property owner
- ◆ Results with elevated lead, arsenic, or mercury qualify for remediation
- ◆ Access agreement to be completed by property owner and notarized
- ◆ Contamination is cleaned-up free of charge

Eric Hassler  
406-497-5042  
ehassler@bsb.mt.gov

Michele Bay  
406-497-5045  
mbay@bsb.mt.gov





# **Butte-Silver Bow**

## **Residential Metals Abatement Program**

345 Anaconda Road  
Butte, MT 59701

**FREE Sampling for Property Owners**



**Please Call Us at 497-5040 to Schedule an Environmental Assessment**

**Samples are analyzed for potential Lead, Arsenic, and Mercury contamination due to past mining activity in the area**

- ◆ Property owner completes the sample request form
- ◆ Schedule a time for samples to be collected
- ◆ Attic dust, indoor dust, and soil samples (weather pending) are collected and analyzed by a certified lab
- ◆ Confidential results will be mailed to the property owner
- ◆ Results with elevated lead, arsenic, or mercury qualify for remediation
- ◆ Access agreement to be completed by property owner and notarized
- ◆ Contamination is cleaned-up free of charge

**Please contact us with any questions or to schedule an Environmental Assessment**

Chad Anderson

406-497-5040

[canderson@bsb.mt.gov](mailto:canderson@bsb.mt.gov)

Brandon Warner

406-497-5040

[bwarnar@bsb.mt.gov](mailto:bwarnar@bsb.mt.gov)



# Lead Paint:

Is it in your child-care center, home, school or anywhere children may be present?

Many contractors and maintenance workers who have been on the job for years believe they know all about the dangers of and the precautions necessary for working with lead paint. Others think lead paint poisoning simply went away years ago. It didn't.

That's why you need to know the facts about lead paint, and how disturbing it poses serious health risks to the people in your building, especially children.

There are requirements in place to protect children from these dangers. If your pre-1978 in-home daycare, child-care center, school or hospital is being renovated, repaired or painted, this pamphlet is for you. In it, you'll learn about the dangers of lead

paint, how to hire a Lead-Safe Certified contractor, and how to make sure your own maintenance staff is doing the right thing.



# The Truth About Lead Paint Poisoning

Lead paint is an invisible danger. Here are some facts about lead paint that everyone should know:

- Even small levels of exposure to lead paint can harm both children and adults.
- Hundreds of thousands of kids are affected by lead paint with some level of irreversible damage, such as lower intelligence, learning disabilities and behavioral issues.
- New cases of childhood lead paint poisoning are diagnosed every year. Many more go unreported.
- Recent research shows that new cases can be directly linked to renovations where the work environment was inadequately cleaned and contained.
- Adults exposed to lead paint can suffer from high blood pressure, headaches, dizziness, diminished motor skills, fatigue and memory loss.
- It's not just lead paint chips that poison. Contamination can be caused by only a little bit of lead dust that is easily inhaled or ingested.
- Once poisoned, effects may be for life.



United States  
Environmental Protection  
Agency

To learn more,  
visit [epa.gov/getleadsafe](http://epa.gov/getleadsafe)  
or call 800-424-LEAD

To report a violation, visit  
[epa.gov/tips](http://epa.gov/tips)



# IF YOU DISTURB PAINT YOU MUST GET LEAD-SAFE CERTIFIED

Child Care Providers:  
Make sure you or  
your contractor is  
Lead-Safe Certified





# Was Your Child-Care Facility Built Before 1978? If Yes, Then:

## Where Does The Lead Danger Come From Today?

In earlier decades, the fear of children eating lead paint chips was the main concern when it came to poisoning. But since then, research has shown that the most common way to get lead in the body is from inhaling or ingesting microscopic dust.



Day-to-day wear, as well as common renovation and repair activities, like sanding, cutting and demolition, can create hazardous lead dust and chips. Proper work practices can help protect the people in your building, especially children, from this dust.

Even for small jobs, the key is to use lead-safe work practices such as containing dust inside the work area, using dust-minimizing work methods and conducting a careful cleanup. It also means keeping people out of the work area. Most importantly, it means making sure that anyone who does work in your building is Lead-Safe Certified.

## How Do I Choose The Right Contractor?

A responsible operator of a child-care facility will be sure to hire only contractors who are Lead-Safe Certified to work in a building built prior to 1978.

Here are a few helpful tips:

- Verify that a contractor is certified by checking the EPA website at [epa.gov/getleadsafe](http://epa.gov/getleadsafe) or by calling **1-800-424-LEAD**. You can also ask to see a copy of the contractor's Lead-Safe RRP firm certification.
- Ask if the contractor is trained to perform lead-safe work practices and ask to see a copy of their lead-safe training certificate.
- Make sure your contractor can explain clearly the details of the job and how the firm will minimize lead hazards during the work process.
- Ask what lead-safe methods will be used to set up and perform the job in your in-home daycare, child-care center, school or hospital.
- Always make sure the contract is clear about how the work will be set up, performed and cleaned.

## Does My Staff Have To Be Lead-Safe Certified?

Federal law requires that if you or someone on your staff is performing the work (including routine maintenance that disturbs paint), your organization must be Lead-Safe Certified as a firm and your staff must be trained in lead-safe work practices. If not, you could face tens of thousands of dollars in fines. Plus, you put the health of yourself, your workers, and your children at risk, which could result in lawsuits. These work practices include:

- Containing the work area.
- Avoiding renovation methods that generate large amounts of lead-contaminated dust.
- Cleaning up thoroughly.



## Becoming Lead-Safe Certified

1. Individual renovators must be certified. Get certified by attending a one-day Renovation, Repair and Painting (RRP) Rule course. The price for this course is set by private trainers accredited by the EPA. To find an accredited trainer near you, visit [epa.gov/getleadsafe](http://epa.gov/getleadsafe) or call **1-800-424-LEAD**.
2. Your firm also must be certified. Apply for certification by completing and submitting an application and fee.
3. Visit our website [epa.gov/getleadsafe](http://epa.gov/getleadsafe) to find a training course, download the application and get more information.



Look for the Logo

EPA regulations now mandate that any contractor or maintenance staff, from plumbers to electricians to painters, who disturbs more than six square feet of paint or replaces windows while working in a pre-1978 home or child-care facility, must now be Lead-Safe Certified and trained in lead-safe work practices. If not, they could face tens of thousands of dollars in fines.





# Runs better unleaded



For more information on preventing lead poisoning  
call 1-800-424-LEAD or visit [www.epa.gov/lead](http://www.epa.gov/lead).





## **Program Services Provided**

### **Sample collection to determine if contaminants of concern are present:**

\* Prior to sample collection, the property owner must complete a sample request form provided by the program.

The samples collected are:

- Attic dust
- Indoor dust
- Soil (yards, earthen basements)
- Lead-based paint

### **Contaminants of Concern are:**

#### **Lead, Arsenic, and Mercury**

The attic dust and indoor dust samples are analyzed by a certified lab for lead, arsenic, and mercury

The soil samples are analyzed by a certified lab for lead and arsenic.

Lead-based paint will be analyzed using a XRF analyzer in accordance with HUD guidelines

Confidential sample results will be provided to the property owner approximately 10 days after samples are collected.

### **Local Action Levels for Dusts and Soils:**

The local action level for **lead** is **1200 mg/kg**.

The local action level for **arsenic** is **250 mg/kg**.

The local action level for **mercury** is **147 mg/kg**.

### **Sample Results That Exceed the Local Action Levels:**

Any sample results that exceed the local action levels for any or all of the three contaminants of concern will be prioritized for remediation of the contaminants.

An Access Agreement shall be completed by the property owner and notarized prior to the remediation process.

### **Remediation:**

\* The property owner is not liable for any costs or responsibilities associated with the remediation of the property.

**Contaminated attic dust** – dust and any potentially contaminated materials are removed from the attic with a HEPA -equipped industrial vacuum.

**Contaminated indoor dust** - dust is removed with a HEPA- equipped vacuum and all horizontal surfaces are wiped-down to ensure that the contaminants are removed.

**Contaminated soils** - soils are removed and replaced with clean fill, sod, and/or other specified materials. Trees, shrubs, fences, sidewalks, etc. are left in place upon the owners request.

**Lead-based Paint** - lead-based paint will be addressed in conjunction with soil remediation projects as necessary. Lead-based paint will be addressed when a resident is identified with an elevated blood-lead level determined by blood-lead testing.

### **Blood-Lead Testing:**

Free blood-lead testing is offered and encouraged through the Women Infants & Children (WIC) office located at the Butte-Silver Bow Health Department. All elevated results are reported to the Residential Metals Program for further evaluation.

## **Residential Metals Program**

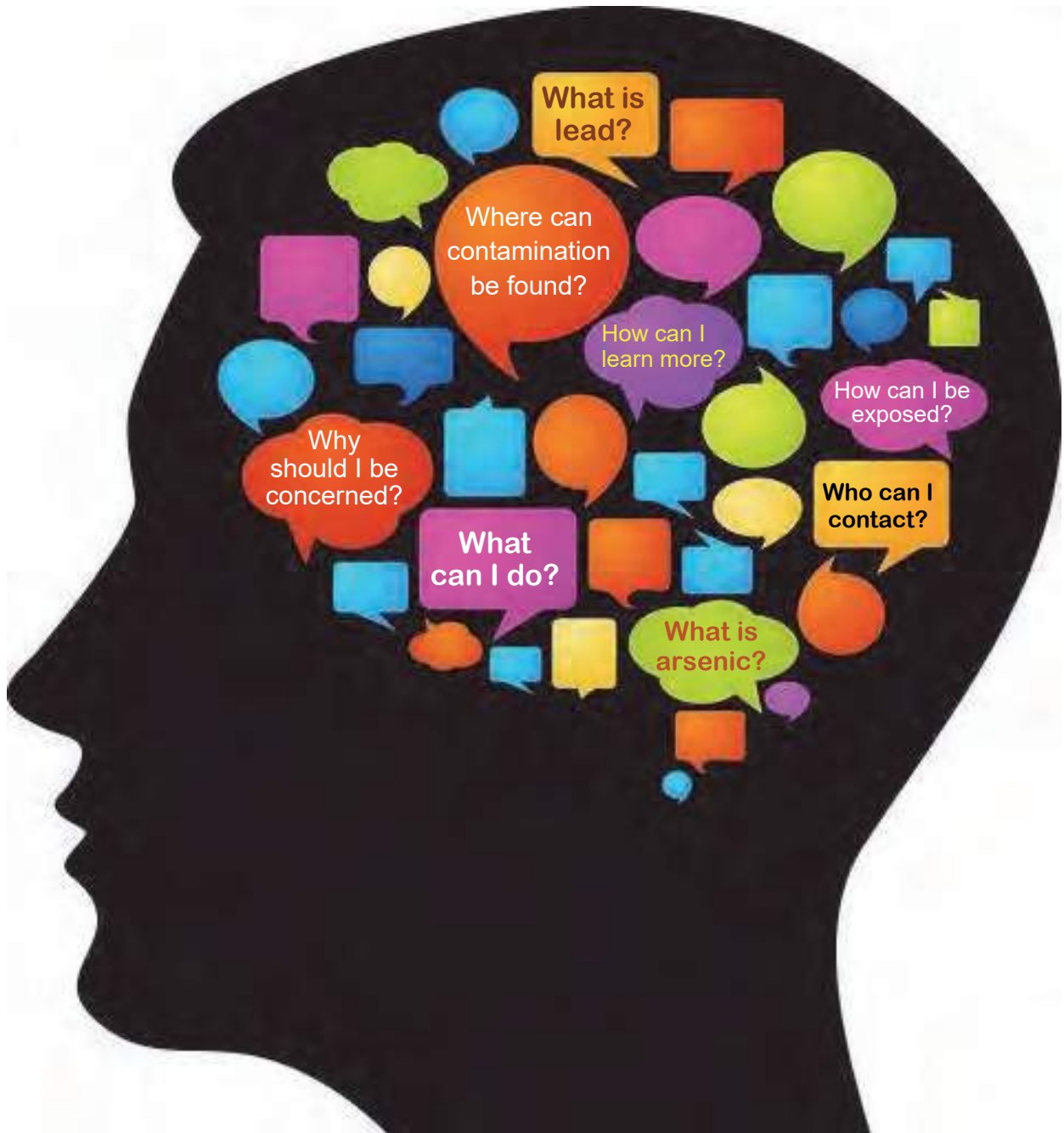
**Butte-Silver Bow  
Health Department**

**25 W. Front St.  
Butte, MT 59701**

**Phone: 406-497-5040  
Fax: 406-723-7245**



# Be Contaminant Smart



Help protect yourself, your family, and your community from mining-related contamination in Butte, Montana

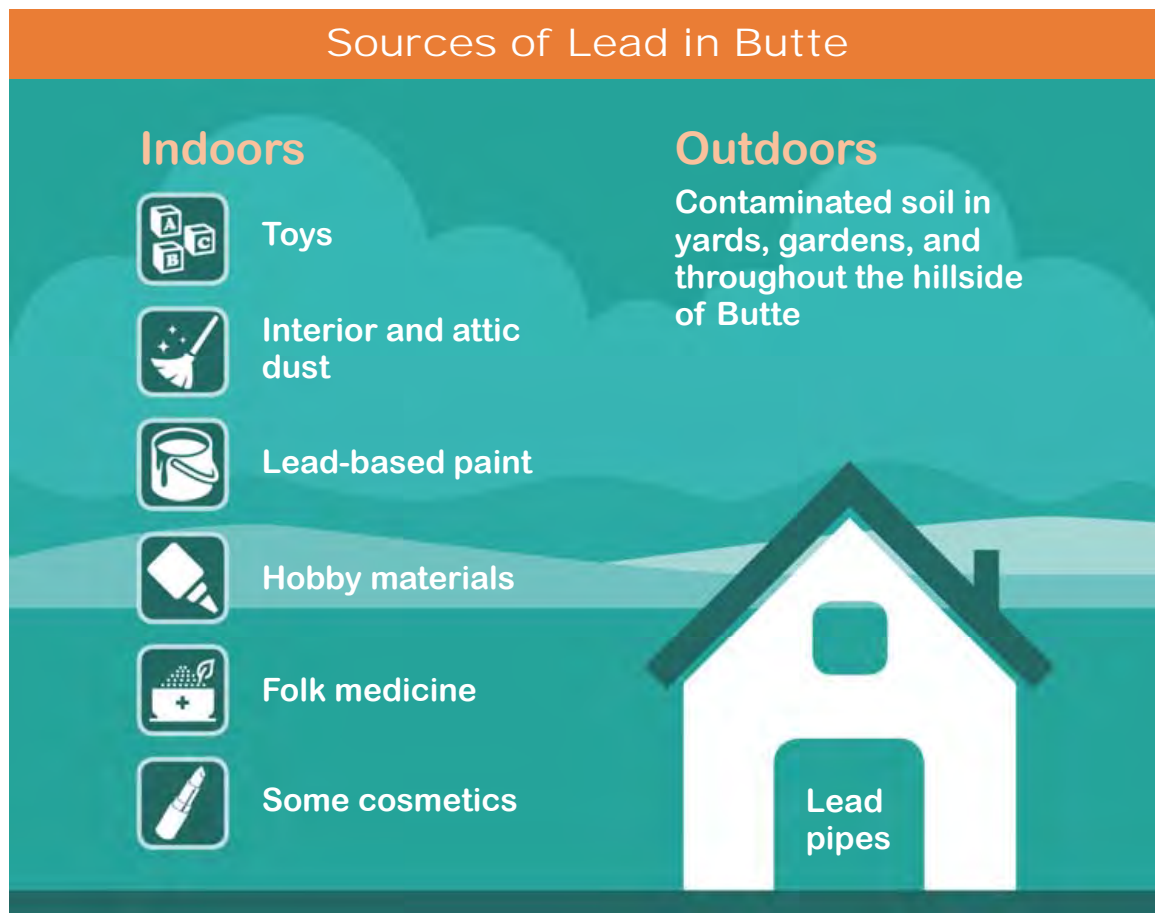


## Be Safe and Avoid Mining Impacts

Land in and around Butte has been impacted by over a century of mining, leaving potentially harmful contamination. Cleanup measures are in place to ensure that people are protected from mining contamination and to promote comprehensive public health and wellness. **You can help!** There are steps you can take to protect yourself and your family.

### Lead

Lead is the primary contaminant of concern in Butte. It is a naturally occurring element in the earth's crust and is found in higher soil concentrations in Butte because of historic mining activity. There are also many possible sources of lead in the home.



### Arsenic and Other Metals

Arsenic and, to a lesser extent, copper, aluminum, cadmium, iron, mercury, and zinc are also contaminants found in Butte. Like lead, they are naturally occurring elements in the earth's crust and found in higher concentrations in Butte because of historic mining activity.



## Exposure Pathways

Exposure pathway is the term used to describe how people come in contact with a contaminant. In Butte, the exposure pathways for lead, arsenic, and the other contaminants of concern are similar. They include breathing, touching, and eating. For lead, exposures can also occur to the fetus during pregnancy causing reduced growth and premature birth.



Sampling and testing are the only way to know if your soil is contaminated.

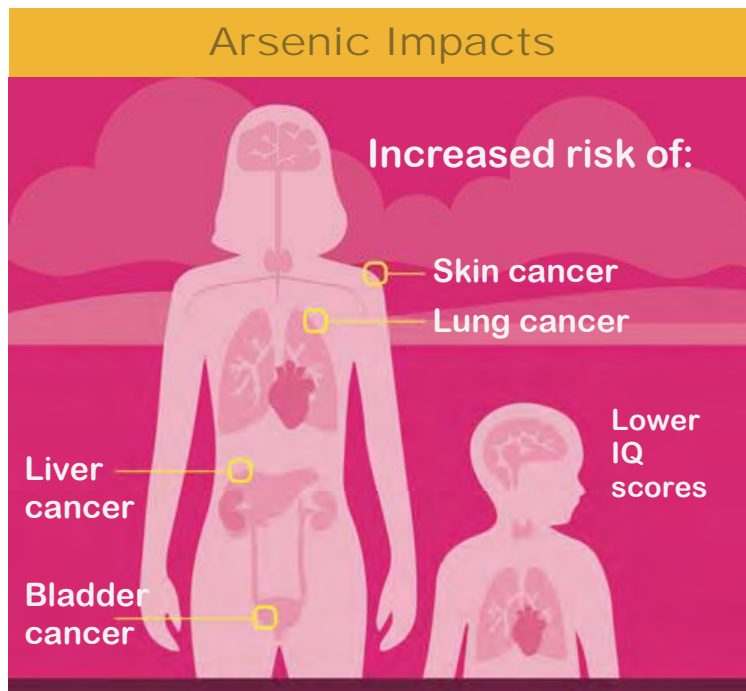


## Understanding Health Impacts

Lead is a poisonous metal that can cause learning, hearing, and behavioral problems. While it has beneficial uses, it can be toxic to humans and animals and can cause adverse health effects.

Lead can accumulate in our bodies over time. It is stored in bones along with calcium. **Children are more at risk from lead!** Exposure to lead can harm a child's brain, kidneys, and other organs. Children 6 years and younger are most susceptible since their nervous systems are still developing.

Even low levels of lead in the blood of children can result in serious problems. Children with elevated



blood-lead levels usually do not look or act sick. The only way to know if your child has lead poisoning is by getting a blood test.

Like lead, exposure to arsenic can be bad for your health. Arsenic is a known carcinogen and can impact the skin, bladder, liver and lungs. Some studies have also shown that arsenic exposure in children can result in lower IQ scores.



## Working Together

People are working together in Butte to ensure residents are protected from lead and arsenic and other potentially harmful contamination. Community groups, the City and County of Butte-Silver Bow, the Montana Department of Environmental Quality, and the U.S. Environmental Protection Agency Superfund Program are cooperating to address the contamination and promote education and blood-lead testing to protect human health and the environment.

## The Plan For Protection: Water

### Drinking Water

Water from Butte faucets is not contaminated and comes from sources outside of Butte, including the upgraded Basin Creek Reservoir. It is safe to drink and routinely tested.



### Groundwater

In certain areas of Butte, groundwater is contaminated. Use of this groundwater is restricted to prevent exposure and it is not allowed to be used for drinking. The contaminated groundwater is captured and treated before it is discharged into streams.



### Storm Water

Water that flows through Butte in creeks after rain and snow melt can transport surface contamination that is potentially harmful to aquatic life. The plan is to manage this water to reduce spreading contamination around Butte.





## The Plan For Protection: Soil

### Removal

- Millions of cubic yards of mine tailings and contaminated soil in Butte have been removed to prevent human exposure.
- Removals include contaminated yard soils and interior sources of lead such as lead paint and attic dust through Butte-Silver Bow's Residential Metals Abatement Program (RMAP).
- Removal actions are ongoing in Butte.

#### The RMAP Will:

- Sample and analyze your home and yard.
- Clean up contaminated attic dust, indoor dust, yards and lead paint if needed.
- Provide these services free and with minimal disruption to the home occupant.



**Learn more about the program by calling 406-497-5040 or visiting the RMAP website.**

### Capping

- Potentially hazardous contaminated soil that is not removed is covered with a protective layer of clean soil.
- These "caps" are maintained by Butte-Silver Bow County and are monitored using the Butte Reclamation and Evaluation System to ensure they are protective.
- The Butte Reclamation and Evaluation System is:
  - \* Implemented in cooperation with the Clark Fork Watershed Education Program.
  - \* Responsible for evaluating all reclaimed areas (25 percent of all sites evaluated annually).
  - \* Responsible for correcting protective cap problems under EPA approved work plans.



## The Plan For Protection: Programs

### Blood Lead Screening

- Available to all county residents at no charge through Butte-Silver Bow's Women, Infants, and Children Program (406-497-5060).



### Public Education

- Projects are ongoing in Butte through community outreach by public, private, and non-profit groups.



### Butte-Silver Bow Women, Infants, and Children Program

- Offers and encourages free blood-lead testing at the County Health Department.
- Reports all elevated results to the RMAP for further evaluation.
- Provides a range of resources to improve health and nutrition to women, infants, and children up to 5 years of age.





## Be Contaminant Smart: Family

Contamination from historic mining will remain in Butte even after cleanup is complete. In addition to the cleanup measures, there are things you can do to for your family to be contaminant smart.

### Choose a Healthy Diet

- Eat iron-rich foods. Normal iron levels protect the body from lead. Good sources of iron are lean meats, fortified cereals, and dried fruits.
- Eat calcium-rich foods. Calcium reduces lead absorption. Good sources of calcium are green leafy vegetables, milk, and cheese.
- Eat regularly. Children with empty stomachs absorb more lead. Provide children 4 to 6 small meals during the day.

### Properly Prepare Garden Produce

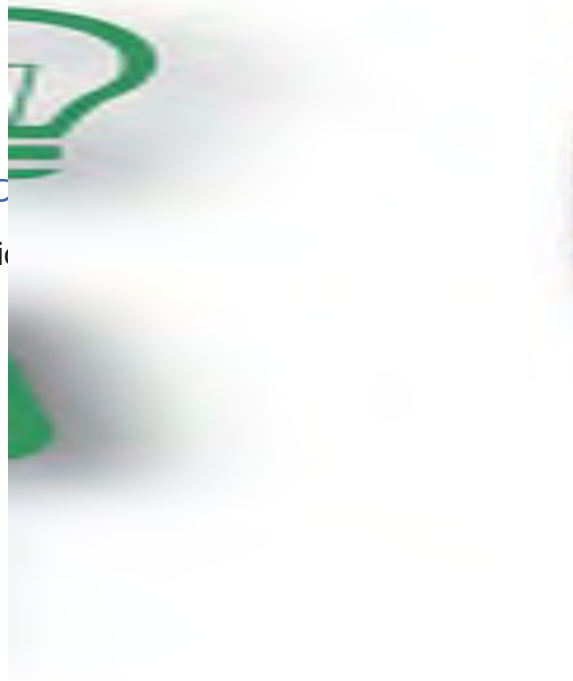
- Keep preparation surfaces clean.
- Wash produce to remove soil.
- Throw away the outer leaves of leafy vegetables and peel root crops to remove the skin and any residual soil.

### Test Your Kids for Lead

- Enroll in the blood-lead testing program with Butte County's [Women, Infants, and Children Program](#) by calling 406-497-5060.

### Stay Informed

- Read and follow the suggestions in the EPA's [Guide \*Fight Lead Poisoning with a Healthy Diet\*](#).
- Learn and educate others about lead, arsenic, and other contaminants in Butte.





## Be Contaminant Smart: Home

Safety starts at home and there are important and simple practices you can follow to keep your family healthy.

### Keep Things Clean

- Keep your home clean and dust-free. This will cut down on the amount of contamination present in the environment.
- Wash hands and toys frequently to help prevent spreading germs and cut down on colds.
- Keep painted surfaces in good condition and clean around painted areas where friction can generate dust, such as around doors, windows and drawers.



### Understand and Identify Potential Sources

- Identify and limit exposure to products that may contain lead. These may include toys, cosmetics, crafts, and other items.
- If buying a home built before 1978, find out if it contains lead-based paint. A seller must disclose any known lead-based hazards.

### Don't Create Unnecessary Exposures

- Practice safe do-it-yourself renovations. Read and follow guidance in the EPA pamphlet *Renovate Right*.

### Stay Informed

- Read and follow the suggestions in EPA's brochure *Protect Your Family from Lead in Your Home*.
- Contact Butte-Silver Bow's [Residential Metals Abatement Program](#) to have your home tested for lead and arsenic (406-497-5040).

**Web link to *Renovating Right*:**

[www.epa.gov/lead/lead-safe-certified-guide-renovate-right-2](http://www.epa.gov/lead/lead-safe-certified-guide-renovate-right-2)

**Web link to *Protect Your Family from Lead in Your Home*:**

[www.epa.gov/lead/protect-your-family-lead-your-home](http://www.epa.gov/lead/protect-your-family-lead-your-home)



## Be Contaminant Smart: Outside

Gardening is a fun and healthy hobby and there are contaminant smart tips to help keep gardening safe.

### Don't Let Contamination Into Your Home

- Leave dirty shoes at the door.
- Reduce dirt brought in by pets.
- Wash children's hands, bottles, pacifiers and toys often especially if they contact soil.
- Avoid contact between gardening clothes and furniture.
- Wash garden produce thoroughly to remove soil completely.

### Garden Carefully

- Wear gloves while gardening and when harvesting produce.
- Add organic materials, like compost, manure, leaves, or grass clippings to your garden. Organic compounds bind lead and make it less available to contaminate plants.
- Add mulch to the garden to reduce dust and prevent soil from splashing onto plants during irrigation or rainstorms.
- Locate your garden as far as possible from busy streets, highways, or old buildings. Traffic can spread dust contaminated with lead and old buildings may shed lead paint.
- Encourage kids to play away from the garden.
- Select plants with shallow roots to ensure that roots do not reach contaminated soil. Increase planting of fruits and vegetables that grow on vines and on fruit trees.
- Grow crops in containers filled with clean soil or build raised beds using safe materials.





## Be Contaminant Smart: Taboos

Finally, there are some things to avoid to be contaminant smart and keep your family safe.

# STOP!

- DO NOT know what you have. Do not assume lead, arsenic or other potentially harmful contamination.
- DO NOT let children chew or put paint chips in their mouths.
- DO NOT let children eat dirt.
- DO NOT try to remove lead-based paint yourself. Call the RMA or use an EPA certified or approved contractor and follow the guidance of EPA's **Renovation, Repair and Painting Program**.
- DO NOT allow children to play in known lead-based paint chips or contaminated soil.



Remember, the Butte-Silver Bow RMA provides that

Remember, the Butte-Silver Bow RMAP is your best resource for help with lead paint identification and removal and for dealing with attic dust. Their assistance is provided at no cost to you.



## Contacts for More Information

### Citizens for Labor and Environmental Justice

- [www.facebook.com/Citizens-for-Labor-and-Environmental-Justice-860260360719942/](https://www.facebook.com/Citizens-for-Labor-and-Environmental-Justice-860260360719942/)
- 406-496-4228

### Citizens Technical Environmental Committee

- [www.buttectec.org](http://www.buttectec.org)
- 406-723-6247

### City and County of Butte-Silver Bow

- [www.co.silverbow.mt.us](http://www.co.silverbow.mt.us)
- Health Department, 406-497-5020
- Women, Infants and Children Program, 406-497-5060
- Residential Metals Abatement Program, 406-497-5040

### Montana Department of Environmental Quality

- [www.deq.mt.gov/Land/fedsuperfund](http://www.deq.mt.gov/Land/fedsuperfund)
- 406-444-6444

### U.S. Environmental Protection Agency

- [www.epa.gov/mt](http://www.epa.gov/mt)
- 406-457-5000



## **Appendix G**

# **Institutional Controls Management System Plan**



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**SILVER BOW CREEK/BUTTE AREA NPL SITE  
BUTTE PRIORITY SOILS OPERABLE UNIT**

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***Institutional Controls Management System***

***Butte-Silver Bow County  
and  
Atlantic Richfield Company***

**October 2019**



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# **SILVER BOW CREEK/BUTTE AREA NPL SITE BUTTE PRIORITY SOILS OPERABLE UNIT**

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## ***Institutional Controls Management System***

Prepared for:

***Butte Silver Bow***  
Superfund Division  
155 W. Granite  
Butte, MT 59701

And

***Atlantic Richfield Company***  
317 Anaconda Road  
Butte, Montana 59701

Prepared by:

***TREC Inc.***  
*A Woodard and Curran Company*  
1015 S Montana St Suite C  
Butte, Montana 59701

**October 2019**



Table of Contents

1 INTRODUCTION..... 1

1.1 Purpose..... 1

1.2 Project Background..... 1

1.3 Goals and Objectives..... 1

1.4 Plan Scope..... 2

2 ICMS OVERVIEW..... 2

2.1 GIS Data..... 2

2.2 Analytical Laboratory Data..... 3

2.3 CPMP Data..... 3

2.4 Ownership and Land Usage ..... 4

2.5 Security and Access ..... 4

2.6 Backups ..... 4

2.7 Quality Management System ..... 4



## **1 Introduction**

### **1.1 Purpose**

This Plan describes the Institutional Controls Management System (ICMS) that is currently being maintained by the City and County of Butte Silver Bow (BSB) to implement Institutional Controls (ICs) obligations required pursuant to the Institutional Controls Implementation and Assurance Plan (ICIAP). Implementation of this plan will provide the following benefits:

- Processes for the tracking of IC's and activities on the property.
- Improved visibility of activities taking place within the Butte Priority Soils Operable Unit (BPSOU) and adjacent areas.
- Controlled methods for the collection and reporting of data.

Currently the ICMS will evolve with technology and be updated as applicable.

### **1.2 Project Background**

The BPSOU covers an area of approximately five square miles and is located a few miles west of the continental divide. Contaminants at the site, including arsenic and heavy metals such as copper, lead, mercury, and zinc, are the result of over 100 years of hard rock mining, smelting, milling, and other processing activities. Mining and ore-processing wastes represent the primary source materials. These wastes come in several different forms, including mill tailings, waste rock, slag, smelter fallout, and mixed combinations of each. Arsenic and metals contained in or released from these wastes to soil, surface water, and groundwater, may pose significant risks to human and ecological receptors without appropriate remediation as described in the BPSOU ROD.

### **1.3 Goals and Objectives**

The ICMS is fundamental to Atlantic Richfield (AR) and BSB's ability to meet their IC responsibilities in an efficient and cost-effective manner. With the current rate of technological advancement in computer systems, this plan is written with flexibility for upgrades in technology that will occur over time. However, the core goals of the system will remain the same and are detailed below:

- Provide up-to-date, easy access to remedial data and Superfund activities to help promote development within the County, while also protecting Superfund remedies.
- Supply data and information to County residents and prospective property owners regarding remedial activities for all media (soil, water and dust) that have been performed on their property, both to ensure the integrity of the remedy and assure the protectiveness of human health.
- Provide up-to-date information to the Agencies about remedy management activities within BPSOU, including as-built information, if available for previously completed remedial activities.



- Provide a tracking system for Institutional Controls that is accessible, current, and reduces the time and effort required for reporting activities to the Agencies.

## **1.4 Plan Scope**

The Plan scope is to describe how data will be updated, maintained and stored in the ICMS. The ICMS is a computer-based tool that is used for creating, documenting, saving, editing, analyzing, sharing, and displaying spatial data (data that is linked to a location). The ICMS provides an easy to use, quick, and efficient mechanism for querying data. The server aspect of the ICMS allows the data to be stored as a single database at a single location, but the data contained is available to identified users with an internet connection and valid access credentials.

The data that will be maintained in the ICMS include:

- All data and other information obtained in connection with Response Actions performed within BPSOU by Atlantic Richfield or BSB or any other Person or Governmental Entity;
- All data and other information obtained in connection with Operation and Maintenance Activities within BPSOU, performed by Atlantic Richfield or BSB (data will be recorded, stored, and managed in a separate database);
- All data and pertinent information compiled as part of the implementation of the Butte Reclamation and Evaluation System (“BRES”) including establishing an application that provides a mechanism for community members to report issues with capped areas or stormwater conveyance systems;
- All data and other information in connection with RMAP property investigations, including the ROD and ESD-required systematic sampling, assessment and abatement (if action levels are exceeded) of all residential properties with the BPSOU and attic dust in residential properties within the Butte Site along with tracking: 1) properties for which access has been obtained, properties sampled, and cleanup completed; 2) properties where access has been denied (and data for such properties); and 3) residential attics that would be cleaned up IF a pathway occurs in the future through remodeling;
- All data and information relating to applicable requirements under the Growth Policy and/or Zoning Ordinance;
- All data and information relating to CGWA.

## **2 ICMS overview**

When managing information in the systems, BSB and Atlantic Richfield will be responsible for all reporting and accuracy assurance related to that information. BSB or Atlantic Richfield will not be held accountable for the accuracy of data obtained from third parties for use in the ICMS.

### **2.1 GIS Data**

BSB is implementing a GIS platform suitable for the storage of all geospatial data required to implement and perform the ICs obligations. Currently that platform is ESRI’s ArcGIS online platform in conjunction with online accessible SQL databases. The data stored, updated and



maintained by BSB will include, but will not be limited to, superfund information (BRES property maintenance records, aerial photographs and information regarding property ownership, access rights, remedial actions and environmental sampling data), proprietary controls (including restrictive covenants), field data, and as-built engineering figures. In addition, this platform will contain overlays to be used in providing information related the Governmental controls including the areas described in the Growth Policy/Zoning ordinance, the Controlled Groundwater Area and other overlays described in the various other ordinances. This system is continually evolving and new functionality will be added as needs arise.

## **2.2 Analytical Laboratory Data**

BSB currently maintains several databases related to ICs including the Residential Metals Abatement Program, Butte Reclamation Evaluation System, and Superfund Operations and Maintenance Database. Analytical Laboratory Data is currently stored in program-specific databases, once QA/QC has been completed. The platforms are SQL databases accessible online through web or desktop-facing portals. These platforms allow for the automated upload of analytical data which is associated with the property from which the sample was taken. The system includes the capability to provide reports and or tables based on the analytical data which in turn are included in the various documents provided to the landowners and Agencies and used to determine next steps in the abatement process.

## **2.3 CPMP Data**

Information associated with implementation of the Community Protective Measures Program by BSB is available in the BSB ICMS. Information collected as part of this program includes geographic information, outreach tracking, access tracking, sample data, abatement status and documents associated with the property. The geographic information is stored in the above-mentioned ArcGIS online platform. The sample data and all other data, including copies of the various documents, are stored in the SQL/web based RMAP online portal. However, there still exists a number of residences that have been addressed in the past which will have hardcopy records stored at the RMAP office.

Outreach attempts are a large part of this system. The record for the property starts with the first outreach attempt where an outreach packet is sent to the residence and the property is assigned an identification number. The results of that attempt are recorded in the system for that property (i.e. access granted, denied, no response etc.) including any concerns expressed by the owner. If subsequent attempts are needed for a property those attempts are also recorded in the system. Once an access agreement is secured for the property the access status is recorded and a copy of the agreement is included in the record. From there, geographic layers are created for the property to help coordinate the sampling within the yard and to depict where samples were taken within the property; the data is the imported and stored in the ArcGIS online platform. Once analytical results are received from the lab, the results are entered into the system and an abatement plan is prepared and implemented, if needed. Copies of all documents prepared for the property are included as part of the property record and the current status of the property is indicated within the record.



## **2.4 Ownership and Land Usage**

Butte-Silver Bow Land Records Department maintains a land records system that: a) provides a single point of contact for public access to information related to land records; b) provides and uses automated tools to manage the voluminous land records and furnish timely and accurate land information to facilitate decisions on land issues; and c) allows for timely and efficient data sharing within all offices and departments of the city-county. The Montana State Library maintains the Cadastral website and BSB regularly provides land ownership information to the Montana State Library for incorporation into the Montana Cadastral system, which enables the general public to access land records information. In addition to contributions to the Cadastral system, Land Records Department maintains information pertaining to parcels of real property including information regarding location, geocode, ownership, and land use.

## **2.5 Security and Access**

The ICMS conforms to industry best practices regarding data management and security which includes user level log in criteria with different levels of access. These levels of access include administrative (data maintainers and gatekeepers), user (access to read only data and report), and guests (limited read only access to public information).

## **2.6 Backups**

The ICMS will be appropriately backed up to mitigate the risk of data loss due to hardware or other system failure. The backup schedule and backup types will be aligned with best practices for the software on which the system is built.

## **2.7 Quality Management System**

Computer hardware, and hardware/software configurations used in support of the ICMS will be installed, tested, used, and maintained as detailed in the Quality Management Plan (QMP) and Data Management Plan (DMP). Hardware/software configurations will be tested, and any issues resolved prior to use. Changes to hardware/software configurations and data storage will be assessed prior to implementation, and any changes will be documented to evaluate the impact of the change to the management system.



## **Appendix H**

### **Example Deed Notice and Access Agreement Forms**

**Appendix H.1 RMAP Access Agreement Request**

**Appendix H.2 RMAP Residential Interior Dust Access Agreement Request**

**Appendix H.3 BRES Access Agreement Request**

**Appendix H.4 Agency Enforcement Letters**



**Appendix H.1 RMAP Access Agreement Request**



## RESIDENTIAL ACCESS AGREEMENT

\_\_\_\_\_ (“Owner”) and Butte-Silver Bow County (“BSB”) enter into this Residential Access Agreement (“Agreement”) this \_\_\_\_\_ day of \_\_\_\_\_.

### RECITALS

A. BSB has received funding to conduct certain sampling and abatement activities on certain residential properties located in Butte-Silver Bow County.

B. BSB desires to conduct sampling and abatement activities on certain residential property owned by Owner on the terms and conditions set forth herein.

C. Owner is willing to permit BSB to conduct certain sampling and abatement activities on residential property owned by Owner on the terms and conditions set forth herein.

THEREFORE, in consideration of the mutual covenants and promises contained in this Agreement, Owner and BSB agrees as follows:

1. GRANT OF ACCESS. Owner hereby grants to BSB, EPA (Environmental Protection Agency), MDEQ (Montana Department of Environmental Quality), ATLANTIC RICHFIELD, and their representatives the right to enter Owner’s real property, as further described in Exhibit 1 hereto (the “Property”) for the purpose of conducting the sampling and abatement activities described in paragraph 2 below. Owner warrants and represents to BSB that, to the best of the Owner’s knowledge, Owner possesses ownership in the Property, except as follows:

---

and has the right to grant access to BSB to conduct the described activities.

2. WORK TO BE PERFORMED. Owner agrees to permit BSB and their respective representatives to conduct the sampling and abatement activities described in the Work Plan attached hereto as Exhibit 2 (the “Work”) on the Owner’s Property. The Work will consist of the following phases:



- a.) Initial assessment phase consisting of site and structure analysis, development of abatement strategy, and materials estimate.
- b.) Activities related to the excavation and removal of soils, monitoring and sampling of environmental media and conducting other information gathering activities such as field investigation, data collection, soil boring, testing and periodic monitoring.
- c.) Work phase consisting of the actual residential abatement process.
- d.) Follow up sampling procedure to take place approximately one year after completion of the abatement project.

BSB will make every reasonable effort to minimize any inconvenience to Owner during the performance of the Work on the Property and will work closely with Owner to address any concerns Owner may have about the Work. Unless otherwise agreed in writing by Owner and BSB, or required by EPA, all tools, equipment or other property taken or placed upon the Property by or at the direction of BSB shall remain the property of BSB and may be removed by BSB at any time within a reasonable period after completion of the Work.

3. FUTURE ACCESS. Owner hereby grants access to the Property at all reasonable times to BSB, EPA, MDEQ, ATLANTIC RICHFIELD and their representatives for the purpose of: (a) monitoring Property Owner's compliance with the Covenants set forth in Exhibit 4, (b) conducting any investigation, monitoring, sampling, or other activities with respect to the Property, or (c) undertaking any action that is deemed necessary or advisable with respect to the Property to address environmental conditions thereon.
4. PHOTOGRAPHIC DOCUMENTATION. Owner agrees to permit BSB to create a photographic/video record to document the initial condition of specific areas of the Property, as well as, the post-Work condition of the Property. Copies will be made available for review upon owner's request.
5. INDEMNIFICATION OF OWNER. BSB agrees to indemnify and hold harmless Owner from any and all actions, claims, demands, liabilities, losses, damages or expenses, including damage to property or for loss of use of property, which may be imposed on or incurred by Owner as a result of BSB's negligent, reckless, or willful acts or omissions while on the Property, except to the extent that such actions, claims, demands, liabilities, losses, damages or expenses result from the acts or omissions of the Owner. Owner and BSB agree that the Work described in Exhibit 2 shall not give rise to a claim for indemnification under this provision.
6. COVENANT NOT TO SUE AND RELEASE. Owner covenants not to sue BSB and Atlantic Richfield Company ("ATLANTIC RICHFIELD") for, and releases BSB and ATLANTIC RICHFIELD from any liability for actions, claims, demands, losses, damages, expenses, injunctive relief, indemnification or any other relief or liabilities, including, but not limited to, damages to property or for loss of use of property, arising out of or related to Work described in Exhibit 2, provided that the Work is conducted in accordance with Exhibit 2.



- 2 -

7. COVENANTS, NOTICE OF COVENANTS AND NOTICE OF COMPLETION.  
Owner hereby agrees to abide by and impose the Covenants set forth in Exhibit 4. Contemporaneous with the execution of this Agreement, in order to provide notice of the Covenants and the Work performed, Owner also hereby agrees to execute the Notice of Covenants attached hereto as Exhibit 5. It is understood and agreed that the Work Plan attached hereto as Exhibit 2, together with any written modifications thereto, that are agreed upon by BSB and Owner following the execution of the Agreement, shall be attached to and made part of the Notice of Covenants. It is further understood and agreed that BSB shall promptly record the executed Notice of Covenants in the Butte-Silver Bow County real property records following the completion of the Work phase of the residential abatement process.
8. SALE, LEASE, OR OTHER CONVEYANCE OF PROPERTY. Owner agrees that if he/she sells, leases, or otherwise conveys any portion of his/her right, title, or interest in any portion of the Property that all the Covenants set forth in Exhibit 4 shall be included in or attached to the deed, lease, or other conveyance document. The Owner agrees that such Covenants shall be binding on all subsequent owners. If, for any reason, the Owner fails to either abide by the Covenants or include the Covenants in a subsequent sale, lease, or other conveyance of all or any part of the Property, then the indemnification provisions of this Agreement shall be void and of no further force and effect.
9. NOTICE. BSB shall provide Owner with either written or oral notice seven (7) days prior to first commencing the work described in Exhibit 2 on the Property.
10. DELIVERY OF NOTICE. All notices by or pertaining this Agreement shall be in writing and shall be sent to Owner and BSB at the respective addresses below. Either Owner or BSB may designate a different address for receipt of notice by providing written notice of such change to the other. All notices shall be sent by certified mail, return receipt requested to:

**BSB:** Chad Anderson  
Butte-Silver Bow County  
Residential Metals Program  
345 Anaconda Rd. Butte, Montana 59701

**OWNER:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

11. RESTORATION OF PROPERTY. Upon completion of the Work described in Exhibit 2, BSB will, with the exception of the necessary abatement improvements, return the



Property to the condition it was in at the time BSB first entered the Property under this Agreement to the extent practicable, provided that such restoration is not inconsistent with the Work described in Exhibit 2.

- 3 -

12. SOIL SAMPLES. BSB agrees to use its' best efforts to provide, upon Owner's prior written request, a portion of any sample taken on Owner's Property. A "SAMPLE REQUEST" form, attached as Exhibit 3 for Owner's use to request a sample portion has been provided to Owner by BSB.

13. MISCELLANEOUS

- a. Effect of Agreement. Except as otherwise expressly provided in this Agreement, nothing in this Agreement is intended or shall be construed as a waiver of any right, claim, or defense by any party to this Agreement against the other or against any other person or entity under CERCLA or any other law, or as creating any right or benefit in favor of any person or entity. This Agreement and the rights and obligations created hereby shall be binding upon and inure to the benefit of Owner and BSB and their respective assigns and successors in interest.
- b. Negation of Agency Relationship. The Agreement shall not be construed to create, either expressly or by implication the relationship of agency or partnership between Owner and BSB. Neither Owner nor BSB is authorized to act on behalf of the other in any manner related to the subject matter of this Agreement, and neither shall be liable for acts, errors, or omissions of the other entered into, committed, or performed with respect to or in the performance of this Agreement.
- c. Termination. Except with respect to paragraph three (3) on page one, this Agreement will terminate following BSB's written notification that work described in Exhibit 2 is complete.
- d. Governing Law. This Agreement shall be governed by and construed in accordance with the laws of the State of Montana and will be in the State of Montana.
- e. Construction. Whenever possible, each provision hereof will be interpreted in such a manner as to be effective and valid under applicable law, but if any provision hereof is held to be prohibited by or invalid under applicable law, such provision will be ineffective only to the extent of such prohibition or such invalidity, without invalidating the remainder of such provision or the remaining provisions hereof.
- f. Entire Agreement. This Agree embodies the entire agreement of Owner and BSB with respect to the subject matter hereof, and no prior oral or written



representation shall serve to modify or amend this Agreement. This Agreement may not be modified, except by written agreement signed and duly authorized by Owner and BSB.

- 4 -

IN WITNESS WHEREOF, Owner and BSB have executed this Agreement effective as of the first date written above.

OWNER:

\_\_\_\_\_

Date\_\_\_\_\_

Title: Owner

BUTTE-SILVER BOW:

\_\_\_\_\_

Date\_\_\_\_\_

Title: Superfund Representative

- 5 -



**EXHIBIT 1 TO RESIDENTIAL ACCESS AGREEMENT**

**DESCRIPTION OF PROPERTY**

That certain real property as more fully described in the attached deed dated

\_\_\_\_\_.

Recorded at Roll \_\_\_\_\_, Card \_\_\_\_\_ in the records of Silver Bow County, Montana.



**EXHIBIT 2 TO RESIDENTIAL ACCESS AGREEMENT**

**WORK PLAN**



## EXHIBIT 4 TO RESIDENTIAL ACCESS AGREEMENT

### COVENANTS

- A. CREATION OF CONVENANTS. The following covenants shall burden the Property (described as Exhibit A) and are intended to be covenants of the Property Owner and the Property Owner's successors in interest, assigns, and transferees:
1. No Mining. There shall be no exploration for or mining, milling, processing, drilling, or any other method of development and/or production of any veins, loads, or mineral deposits (including, without limitation, hard rock minerals, sand, gravel, clay or other similar naturally occurring substances) on the Property. All other uses of the Property shall be permitted in accordance with and in a manner consistent with the requirements of applicable laws.
  2. Future Development. The Property Owner shall secure written approval and requisite permits from BSB prior to allowing any development of any kind on the Property, including, without limitation, ground water well drilling or any action that will alter, disturb or otherwise interfere with the Work (described in Exhibit B) performed on the Property. BSB shall approve the proposed development if the Property Owner provides acceptable assurances that the proposed development will be undertaken in accordance with the requirements of all applicable laws including, without limitation, the requirements of the Butte-Silver Bow Reclaimed Areas Guidebook and any applicable ground water control area.
  3. Maintenance. In order to protect and preserve the Work performed on the Property, the Property Owner will keep the Property in good repair, normal wear and tear expected, and will notify BSB of any problems that may arise with the Work. Owner further agrees to provide access to the Property at reasonable times in the future to verify compliance with this Covenant.
  4. Sale, Lease, or Other Conveyance. The Property Owner will disclose the nature of the Work performed on the Property and the terms of these Covenants to any future purchaser, lessee or other occupant of the Property. If the Property Owner sells, leases, or otherwise conveys any portion of his/her right, title or interest in any portion of the Property, the Covenants set forth herein shall be included in or attached to the deed, lease or other conveyance documents. The Property Owner shall also notify BSB of any sale, lease, or other conveyance of the Property.
  5. Obligation to Comply with Residential Access Agreement. The terms and conditions of that certain Residential Access Agreement dated \_\_\_\_\_ shall be binding upon the Property Owners, successors, and assigns and all future purchasers, lessees, or other occupants of the Property.



- B. BENEFITED PROPERTIES - BENEFITS. The Benefited Properties shall include all properties adjacent to or contiguous with the Property. The benefits from the Covenants include: (i) the reduction or minimization of potential risk associated with environmental conditions on, or, under, near, or associated with the Property, and (ii) the maintenance, use, and potential development of the Property in such a manner to allow economic benefits to accrue to the Benefited Properties.
- C. ENFORCEMENT RIGHTS - COVENANTS. BSB, EPA, MDEQ, and each of the Owners (as the same may appear from time to time) of the Benefited Properties shall have the right, but not the obligation, to enforce the Covenants. Each Covenant shall be enforceable, in perpetuity, to the fullest extent permitted by Montana law. All remedies available, at law, or in equity, shall be available for the enforcement of the Covenants. The selection of remedies shall be within the sole discretion of the party entitled to enforce the Covenants. The prevailing party in any action to enforce the Covenants shall be entitled to reasonable attorney's fees and costs incurred in such action.



## EXHIBIT 5 TO RESIDENTIAL ACCESS AGREEMENT

## NOTICE OF COVENANTS

The following property owner(s) hereby agree to have the “Covenants” attached and denoted as Exhibit ‘A’ imposed upon their property and to run with the land.

Legal description: \_\_\_\_\_, \_\_\_\_\_  
 \_\_\_\_\_ Assessor Code: \_\_\_\_\_.

IN WITNESS WHEREOF, \_\_\_\_\_  
 \_\_\_\_\_ Print Name  
 has executed this notice on the \_\_\_\_\_ day of \_\_\_\_\_.

Property owner signature: \_\_\_\_\_

STATE OF MONTANA            )  
  :            SS  
County of Butte-Silver Bow    )

On this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, before me,

\_\_\_\_\_, a Notary Public for the State of \_\_\_\_\_,

Notary State

personally appeared \_\_\_\_\_, and is personally known to me or

Property Owner (s)

thru government-issued identification, the person(s) described in and whose name(s) is/are

subscribed to the within instrument, and acknowledged to me that he/she/they executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my notarial seal the day and year in this certificate above written.

SEAL

SIGNATURE OF NOTARY PUBLIC

PRINT NAME OF NOTARY PUBLIC

FOR THE STATE OF

RESIDING AT \_\_\_\_\_

MY COMMISSION EXPIRES \_\_\_\_\_



**EXHIBIT 6 TO RESIDENTIAL ACCESS AGREEMENT**

**STATEMENT OF COMPLETION**

Owner hereby acknowledges, by signing this Statement of Completion, that work performed by Residential Metals Program was conducted as stated in the Work Plan (Exhibit 2) and completed to the satisfaction of the Owner.

We, the undersigned, agree to the terms of this agreement.

SIGNED: \_\_\_\_\_  
Owner

DATE: \_\_\_\_\_

SIGNED: \_\_\_\_\_  
BSB Representative

DATE: \_\_\_\_\_



**BSB RESIDENTIAL METALS PROGRAM**

**STATEMENT OF RECOGNITION**

Owner hereby acknowledges, by signing this Statement of Recognition, that the work performed by the BSB Residential Metals Program will be conducted as follows: Insulation, debris, boxes, wood, and miscellaneous items left in the attic will be removed and disposed of unless previous arrangements are made with the BSB Residential Metals Program. The attic will only be re-insulated after all electrical in the attic space(s) is brought up to code, bathroom fan is vented properly, and the attic venting has been addressed by the owner (If necessary). The BSB Metals Program will only re-insulate with fiberglass blown-in and/or fiberglass rolls. All other work to be performed is stated in the Work Plan (Exhibit 2) of the Access Agreement and will be completed to the satisfaction of the Owner.

We, the undersigned, agree to the terms of this agreement.

SIGNED: \_\_\_\_\_  
Owner

DATE: \_\_\_\_\_

SIGNED: \_\_\_\_\_  
BSB Representative

DATE: \_\_\_\_\_



**Appendix H.2 RESIDENTIAL ACCESS AGREEMENT**



## RESIDENTIAL ACCESS AGREEMENT

\_\_\_\_\_ (“Owner”) and Butte-Silver Bow County (“BSB”) enter into this Residential Access Agreement (“Agreement”) this \_\_\_\_\_ day of \_\_\_\_\_.

### RECITALS

A. BSB has received funding to conduct certain residential interior dust sampling and abatement activities on certain residential properties located in Butte-Silver Bow County.

B. BSB requests to conduct certain residential interior dust sampling and abatement activities on certain residential property owned by Owner on the terms and conditions set forth herein.

C. Owner is willing to permit BSB to conduct certain residential interior dust sampling and abatement activities on residential property owned by Owner on the terms and conditions set forth herein.

THEREFORE, in consideration of the mutual covenants and promises contained in this Agreement, Owner and BSB agrees as follows:

1. GRANT OF ACCESS. Owner hereby grants to BSB, EPA (Environmental Protection Agency), MDEQ (Montana Department of Environmental Quality), ATLANTIC RICHFIELD, and their representatives the right to enter Owner’s real property, as further described in Exhibit 1 hereto (the “Property”) for the purpose of conducting the residential interior dust sampling and abatement activities described in paragraph 2 below. Owner warrants and represents to BSB that, to the best of the Owner’s knowledge, Owner possesses ownership in the Property, except as follows:

---

\_\_\_\_\_

\_\_\_\_\_

and has the right to grant access to BSB to conduct the described activities.

2. WORK TO BE PERFORMED. Owner agrees to permit BSB and their respective representatives to conduct the residential interior dust sampling and abatement activities described in the Work Plan attached hereto as Exhibit 2 (the “Work”) on the Owner’s Property. The Work will consist of the following phases:



- a.) Initial assessment phase consisting of site and structure analysis, development of abatement strategy, and materials estimate.
- b.) Activities related to abatement project, monitoring and sampling of environmental media and conducting other information gathering activities such data collection and testing and periodic monitoring.
- c.) Work phase consisting of the actual residential interior dust abatement process.

BSB will make every reasonable effort to minimize any inconvenience to Owner during the performance of the Work on the Property, and will work closely with Owner to address any concerns Owner may have about the Work. Unless otherwise agreed in writing by Owner and BSB, or required by EPA, all tools, equipment or other property taken or placed upon the Property by or at the direction of BSB shall remain the property of BSB and may be removed by BSB at any time within a reasonable period after completion of the Work.

- 3. PHOTOGRAPHIC DOCUMENTATION. Owner agrees to permit BSB to create a photographic/video record to document the initial condition of specific areas of the Property as appropriate, as well as, the post-Work condition of the Property. Copies will be made available for review upon owner's request.
- 4. INDEMNIFICATION OF OWNER. BSB agrees to indemnify and hold harmless Owner from any and all actions, claims, demands, liabilities, losses, damages or expenses, including damage to property or for loss of use of property, which may be imposed on or incurred by Owner as a result of BSB's negligent, reckless, or willful acts or omissions while on the Property, except to the extent that such actions, claims, demands, liabilities, losses, damages or expenses result from the acts or omissions of the Owner. Owner and BSB agree that the Work described in Exhibit 2 shall not give rise to a claim for indemnification under this provision.
- 5. COVENANT NOT TO SUE AND RELEASE. Owner covenants not to sue BSB and Atlantic Richfield Company ("ATLANTIC RICHFIELD") for, and releases BSB and ATLANTIC RICHFIELD from any liability for actions, claims, demands, losses, damages, expenses, injunctive relief, indemnification or any other relief or liabilities, including, but not limited to, damages to property or for loss of use of property, arising out of or related to Work described in Exhibit 2, provided that the Work is conducted in accordance with Exhibit 2.
- 6. COVENANTS, NOTICE OF COVENANTS AND NOTICE OF COMPLETION. Owner hereby agrees to abide by and impose the Covenants set forth in Exhibit 4. Contemporaneous with the execution of this Agreement, in order to provide notice of the Covenants and the Work performed, Owner also hereby agrees to execute the Notice of Covenants attached hereto as Exhibit 5. It is understood and agreed that the Work Plan attached hereto as Exhibit 2, together with any written modifications thereto, that are agreed upon by BSB and Owner following the execution of the Agreement, shall be attached to and made part of the Notice of Covenants. It is further understood and agreed that BSB shall promptly record the executed Notice of Covenants in the Butte-Silver



Bow County real property records following the completion of the Work phase of the residential interior abatement process.

7. **SALE, LEASE, OR OTHER CONVEYANCE OF PROPERTY.** Owner agrees that if he/she sells, leases, or otherwise conveys any portion of his/her right, title, or interest in any portion of the Property that all the Covenants set forth in Exhibit 4 shall be included in or attached to the deed, lease, or other conveyance document. The Owner agrees that such Covenants shall be binding on all subsequent owners. If, for any reason, the Owner fails to either abide by the Covenants or include the Covenants in a subsequent sale, lease, or other conveyance of all or any part of the Property, then the indemnification provisions of this Agreement shall be void and of no further force and effect.
8. **NOTICE.** BSB shall provide Owner with written notice seven (7) days prior to first commencing the work described in Exhibit 2 on the Property.
9. **DELIVERY OF NOTICE.** All notices by or pertaining this Agreement shall be in writing and shall be sent to Owner and BSB at the respective addresses below. Either Owner or BSB may designate a different address for receipt of notice by providing written notice of such change to the other. All final notices shall be sent by certified mail, return receipt requested to:

**BSB:** Chad Anderson  
Butte-Silver Bow County  
Residential Metals Program  
345 Anaconda Rd. Butte, Montana 59701

**OWNER:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

10. **RESTORATION OF PROPERTY.** Upon completion of the Work described in Exhibit 2, BSB will, with the exception of the necessary abatement improvements, return the Property to the condition it was in at the time BSB first entered the Property under this Agreement to the extent practicable, provided that such restoration is not inconsistent with the Work described in Exhibit 2.
11. **MISCELLANEOUS**
  - a. **Effect of Agreement.** Except as otherwise expressly provided in this Agreement, nothing in this Agreement is intended or shall be construed as a waiver of any right, claim, or defense by any party to this Agreement against the other or against any other person or entity under CERCLA or any other law, or as creating any right or benefit in favor of any person or entity. This Agreement and the rights



and obligations created hereby shall be binding upon and inure to the benefit of Owner and BSB and their respective assigns and successors in interest.

- b. Negation of Agency Relationship. The Agreement shall not be construed to create, either expressly or by implication the relationship of agency or partnership between Owner and BSB. Neither Owner nor BSB is authorized to act on behalf of the other in any manner related to the subject matter of this Agreement, and neither shall be liable for acts, errors, or omissions of the other entered into, committed, or performed with respect to or in the performance of this Agreement.
- c. Termination. Except with respect to paragraph three (3) on page one, this Agreement will terminate following BSB's written notification that work described in Exhibit 2 is complete.
- d. Governing Law. This Agreement shall be governed by and construed in accordance with the laws of the State of Montana and will be in the State of Montana.
- e. Construction. Whenever possible, each provision hereof will be interpreted in such a manner as to be effective and valid under applicable law, but if any provision hereof is held to be prohibited by or invalid under applicable law, such provision will be ineffective only to the extent of such prohibition or such invalidity, without invalidating the remainder of such provision or the remaining provisions hereof.
- f. Entire Agreement. This Agreement embodies the entire agreement of Owner and BSB with respect to the subject matter hereof, and no prior oral or written representation shall serve to modify or amend this Agreement. This Agreement may not be modified, except by written agreement signed and duly authorized by Owner and BSB.

IN WITNESS WHEREOF, Owner and BSB have executed this Agreement effective as of the first date written above.

OWNER:

\_\_\_\_\_

Date\_\_\_\_\_

Title: Owner

BUTTE-SILVER BOW:

\_\_\_\_\_

Date\_\_\_\_\_

Title: Superfund Representative



**EXHIBIT 1 TO RESIDENTIAL ACCESS AGREEMENT**

**DESCRIPTION OF PROPERTY**

That certain real property as more fully described in the attached deed dated

\_\_\_\_\_.

Recorded at Roll \_\_\_\_\_, Card \_\_\_\_\_ in the records of Silver Bow County, Montana.



**EXHIBIT 2 TO RESIDENTIAL ACCESS AGREEMENT**  
**WORK PLAN**







**EXHIBIT 3 TO RESIDENTIAL ACCESS AGREEMENT**

**SAMPLE REQUEST**

I, the undersigned, am the owner, his/her legal representative, or otherwise control the Property described herein. I have granted access to BSB and their representatives, to enter the Property and to take samples of environmental media from the Property.

I hereby request BSB provide to me a report of the results of that sampling.

Signature of person making request (if made on behalf of another person or company, please identify that party also):

\_\_\_\_\_  
Signature

Date\_\_\_\_\_

Print Name: \_\_\_\_\_

The following is the address at which the requesting party may be contacted and/or the sample portion delivered:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Phone\_\_\_\_\_



## EXHIBIT 4 TO RESIDENTIAL ACCESS AGREEMENT

### COVENANTS

- A. **CREATION OF CONVENANTS.** The following covenants shall burden the Property (described as Exhibit A) and are intended to be covenants of the Property Owner and the Property Owner's successors in interest, assigns, and transferees:
1. **Maintenance.** In order to protect and preserve the Work performed on the Property, the Property Owner will keep the Property in good repair, normal wear and tear expected, and will notify BSB of any problems that may arise with the Work.
  2. **Sale, Lease, or Other Conveyance.** The Property Owner will disclose the nature of the Work performed on the Property and the terms of these Covenants to any future purchaser, lessee or other occupant of the Property. If the Property Owner sells, leases, or otherwise conveys any portion of his/her right, title or interest in any portion of the Property, the Covenants set forth herein shall be included in or attached to the deed, lease or other conveyance documents. The Property Owner shall also notify BSB of any sale, lease, or other conveyance of the Property.
  3. **Obligation to Comply with Residential Access Agreement.** The terms and conditions of that certain Residential Access Agreement dated \_\_\_\_\_ shall be binding upon the Property Owners, successors, and assigns and all future purchasers, lessees, or other occupants of the Property.
- B. **BENEFITED PROPERTIES - BENEFITS.** The Benefited Properties shall include all properties adjacent to or contiguous with the Property. The benefits from the Covenants include: (i) the reduction or minimization of potential risk associated with environmental conditions on, or, under, near, or associated with the Property, and (ii) the maintenance, use, and potential development of the Property in such a manner to allow economic benefits to accrue to the Benefited Properties.
- C. **ENFORCEMENT RIGHTS - COVENANTS.** BSB, EPA, MDEQ, and each of the Owners (as the same may appear from time to time) of the Benefited Properties shall have the right, but not the obligation, to enforce the Covenants. Each Covenant shall be enforceable, in perpetuity, to the fullest extent permitted by Montana law. All remedies available, at law, or in equity, shall be available for the enforcement of the Covenants. The selection of remedies shall be within the sole discretion of the party entitled to enforce the Covenants. The prevailing party in any action to enforce the Covenants shall be entitled to reasonable attorney's fees and costs incurred in such action.







**EXHIBIT 5 TO RESIDENTIAL ACCESS AGREEMENT**

**NOTICE OF COVENANTS**

The following property owner(s) hereby agree to have the "Covenants" attached and denoted as Exhibit 'A' imposed upon their property and to run with the property.

Legal description: \_\_\_\_\_,  
\_\_\_\_\_ Assessor Code: \_\_\_\_\_.

IN WITNESS WHEREOF, \_\_\_\_\_ has  
executed this notice at Butte, Montana on the \_\_\_\_\_ day of \_\_\_\_\_.

\_\_\_\_\_  
NAME OF PROPERTY OWNER (S)

=====

STATE OF MONTANA        )  
  :        ss  
County of Butte-Silver Bow    )

On this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, before me,

\_\_\_\_\_, a Notary Public for the State of Montana,  
Notary

personally appeared \_\_\_\_\_, and is personally known to me or  
Property Owner (s)

thru government-issued identification, the person(s) described in and whose name(s) is/are  
subscribed to the within instrument, and acknowledged to me that he/she/they executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my notarial  
seal the day and year in this certificate above written.

SEAL

\_\_\_\_\_  
SIGNATURE OF NOTARY PUBLIC

\_\_\_\_\_  
PRINT NAME OF NOTARY PUBLIC

FOR THE STATE OF \_\_\_\_\_

RESIDING AT \_\_\_\_\_

MY COMMISSION EXPIRES \_\_\_\_\_



**EXHIBIT 6 TO RESIDENTIAL ACCESS AGREEMENT**

**STATEMENT OF COMPLETION**

Owner hereby acknowledges, by signing this Statement of Completion, that work performed by Residential Metals Abatement Program was conducted as stated in the Work Plan (Exhibit 2) and completed to the satisfaction of the Owner.

We, the undersigned, agree to the terms of this agreement.

SIGNED: \_\_\_\_\_  
Owner

DATE: \_\_\_\_\_

SIGNED: \_\_\_\_\_  
BSB Representative

DATE: \_\_\_\_\_







**Appendix H.3 BRES Access Agreement Request**



**BRES ACCESS AGREEMENT**

\_\_\_\_\_ (“Owner”) and Butte-Silver Bow County (“BSB”) enter into this Residential Access Agreement (“Agreement”) this \_\_\_\_\_ day of \_\_\_\_\_.

**RECITALS**

A. BSB has received funding to conduct certain inspection, monitoring and maintenance work required pursuant to the Butte Reclamation and Evaluation System (“BRES Work”) on certain properties located in Butte-Silver Bow County.

B. BSB desires to conduct BRES Work on certain property owned by Owner on the terms and conditions set forth herein.

C. Owner is willing to permit BSB to conduct certain BRES Work on property owned by Owner on the terms and conditions set forth herein.

THEREFORE, in consideration of the mutual covenants and promises contained in this Agreement, Owner and BSB agrees as follows:

1. **GRANT OF ACCESS.** Owner hereby grants to BSB, EPA (Environmental Protection Agency), MDEQ (Montana Department of Environmental Quality), Atlantic Richfield Company, and their representatives the right to enter Owner’s real property, as further described in Exhibit 1 hereto (the “Property”) for the purpose of conducting all activities and work described in the BRES Site Work Plan attached as Exhibit 2 hereto which may, including without limitation, excavation and/or removal of soils, monitoring and sampling of environmental media, ingress and egress of equipment, machinery and personnel, staging and temporary storage of equipment, and conducting other information gathering activities such as field investigation, data collection, surveys and testing (collectively referred to as the “BRES Work”). Owner warrants and represents to BSB that, to the best of the Owner’s knowledge, Owner possesses ownership in the Property, except as follows:

\_\_\_\_\_  
—  
\_\_\_\_\_

—

BSB will make every reasonable effort to minimize any inconvenience to Owner during the performance of the BRES Work on the Property, and will work closely with Owner to address any concerns Owner may have about the BRES Work. Unless otherwise agreed in writing by Owner and BSB, or required by EPA, all tools, equipment or other property taken or placed upon the Property by or at the direction of BSB shall remain the property



of BSB and may be removed by BSB at any time within a reasonable period after completion of the BRES Work.

2. PHOTOGRAPHIC DOCUMENTATION. Owner agrees to permit BSB to create a photographic/video record to document the initial condition of specific areas of the Property as appropriate, as well as, the post-BRES Work condition of the Property. Copies will be made available for review upon Owner's request.
3. INDEMINIFICATION OF OWNER. BSB agrees to indemnify and hold harmless Owner from any and all actions, claims, demands, liabilities, losses, damages or expenses, including damage to property or for loss of use of property, which may be imposed on or incurred by Owner as a result of BSB's negligent, reckless, or willful acts or omissions while on the Property, except to the extent that such actions, claims, demands, liabilities, losses, damages or expenses result from the acts or omissions of the Owner. Owner and BSB agree that the BRES Work shall not give rise to a claim for indemnification under this provision.
4. COVENANT NOT TO SUE AND RELEASE. Owner covenants not to sue BSB and Atlantic Richfield Company for, and releases BSB and Atlantic Richfield Company from any liability for actions, claims, demands, losses, damages, expenses, injunctive relief, indemnification or any other relief or liabilities, including, but not limited to, damages to property or for loss of use of property, arising out of or related to BRES Work conducted on the Property in accordance with this Agreement.
5. COVENANTS, NOTICE OF COVENANTS AND NOTICE OF COMPLETION. Owner hereby agrees to abide by and impose the Covenants set forth set forth in Exhibit A to the Notice of Covenants attached as Exhibit 3 to this Agreement. Contemporaneous with the execution of this Agreement, in order to provide notice of the Covenants, Owner also hereby agrees to execute the Notice of Covenants attached hereto as Exhibit 5. It is understood and agreed that the BRES Site Work Plan attached hereto as Exhibit 2, together with any written modifications thereto, that are agreed upon by BSB and Owner following the execution of the Agreement, shall be attached to and made part of the Notice of Covenants. It is further understood and agreed that BSB shall promptly record the executed Notice of Covenants in the Butte-Silver Bow County real property records following the completion of the BRES Work.
6. SALE, LEASE, OR OTHER CONVEYANCE OF PROPERTY. Owner agrees that if he/she sells, leases, or otherwise conveys any portion of his/her right, title, or interest in any portion of the Property that all the Covenants set forth in Exhibit A to the Notice of Covenants attached as Exhibit 3 to this Agreement shall be included in or attached to the deed, lease, or other conveyance document. The Owner agrees that such Covenants shall be binding on all subsequent owners. If, for any reason, the Owner fails to either abide by the Covenants or include the Covenants in a subsequent sale, lease, or other conveyance of all or any part of the Property, then the indemnification provisions of this Agreement shall be void and of no further force and effect.



7. NOTICE. BSB shall provide Owner with written notice seven (7) days prior to first commencing the BRES Work on the Property.
8. DELIVERY OF NOTICE. All notices by or pertaining to this Agreement shall be in writing and shall be sent to Owner and BSB at the respective addresses below. Either Owner or BSB may designate a different address for receipt of notice by providing written notice of such change to the other. All final notices pertaining to this Agreement shall be sent by certified mail, return receipt requested to:

**BSB:**        Butte Silver Bow Superfund Division;  
                  Attn: Julia Crain\_\_\_\_\_  
                  Butte-Silver Bow County  
                  155 West Granite Room 112\_\_\_\_\_  
                  \_\_\_\_\_, Butte, Montana 59701

**OWNER:**     \_\_\_\_\_  
                  \_\_\_\_\_  
                  \_\_\_\_\_  
                  \_\_\_\_\_

9. RESTORATION OF PROPERTY. Upon completion of the BRES Work, BSB will, with the exception of the necessary BRES Work, return the Property to the condition it was in at the time BSB first entered the Property under this Agreement to the extent practicable, provided that such restoration is not inconsistent with the BRES Work.

10. MISCELLANEOUS

- a. Effect of Agreement. Except as otherwise expressly provided in this Agreement, nothing in this Agreement is intended or shall be construed as a waiver of any right, claim, or defense by any party to this Agreement against the other or against any other person or entity under CERCLA or any other law, or as creating any right or benefit in favor of any person or entity. This Agreement and the rights and obligations created hereby shall be binding upon and inure to the benefit of Owner and BSB and their respective assigns and successors in interest.
- b. Negation of Agency Relationship. The Agreement shall not be construed to create, either expressly or by implication the relationship of agency or partnership between Owner and BSB. Neither Owner nor BSB is authorized to act on behalf of the other



in any manner related to the subject matter of this Agreement, and neither shall be liable for acts, errors, or omissions of the other entered into, committed, or performed with respect to or in the performance of this Agreement.

- c. Termination. This Agreement will terminate following BSB's written notification to Owner that the BRES Work is complete.
- d. Governing Law. This Agreement shall be governed by and construed in accordance with the laws of the State of Montana and will be in the State of Montana.
- e. Construction. Whenever possible, each provision hereof will be interpreted in such a manner as to be effective and valid under applicable law, but if any provision hereof is held to be prohibited by or invalid under applicable law, such provision will be ineffective only to the extent of such prohibition or such invalidity, without invalidating the remainder of such provision or the remaining provisions hereof.
- f. Entire Agreement. This Agreement embodies the entire agreement of Owner and BSB with respect to the subject matter hereof, and no prior oral or written representation shall serve to modify or amend this Agreement. This Agreement may not be modified, except by written agreement signed and duly authorized by Owner and BSB.

IN WITNESS WHEREOF, Owner and BSB have executed this Agreement effective as of the first date written above.

OWNER:

\_\_\_\_\_

Date\_\_\_\_\_

Title: Owner

BUTTE-SILVER BOW:

\_\_\_\_\_

Date\_\_\_\_\_

Title: Superfund Representative







**EXHIBIT 1 TO BRES ACCESS AGREEMENT**

**DESCRIPTION OF PROPERTY**

That certain real property as more fully described in the attached deed dated

\_\_\_\_\_.

Recorded at Roll \_\_\_\_\_, Card \_\_\_\_\_ in the records of Silver Bow County, Montana.



**EXHIBIT 2 TO BRES ACCESS AGREEMENT**

**BRES SITE WORK PLAN**



**EXHIBIT 3 TO BRES ACCESS AGREEMENT  
NOTICE OF COVENANTS**

The following property owner(s) hereby agree to have the "Covenants" attached and denoted as Exhibit 'A' imposed upon their property and to run with the land.

Legal description: \_\_\_\_\_,  
\_\_\_\_\_ Assessor Code: \_\_\_\_\_.

IN WITNESS WHEREOF, \_\_\_\_\_ has  
executed this notice at Butte, Montana on the \_\_\_\_ day of \_\_\_\_\_.

\_\_\_\_\_  
NAME OF PROPERTY OWNER (S)

=====

STATE OF MONTANA     )  
                                      :       ss  
County of Butte-Silver Bow    )

On this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, before me,  
\_\_\_\_\_, a Notary Public for the State of Montana,  
\_\_\_\_\_  
Notary

personally appeared \_\_\_\_\_, and is personally known to me or  
\_\_\_\_\_  
Property Owner (s)

thru government-issued identification, the person(s) described in and whose name(s) is/are  
subscribed to the within instrument, and acknowledged to me that he/she/they executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my notarial  
seal the day and year in this certificate above written.

SEAL

\_\_\_\_\_  
SIGNATURE OF NOTARY PUBLIC

\_\_\_\_\_  
PRINT NAME OF NOTARY PUBLIC

FOR THE STATE OF \_\_\_\_\_

RESIDING AT \_\_\_\_\_

MY COMMISSION EXPIRES \_\_\_\_\_



## EXHIBIT A TO NOTICE OF COVENANTS

### COVENANTS

- A. CREATION OF CONVENANTS. The following covenants shall burden the Property and are intended to be covenants of the Property Owner and the Property Owner's successors in interest, assigns, and transferees:
1. Future Development. The Property Owner shall secure written approval and requisite permits from BSB prior to allowing or conducting any development of any kind on the Property including, without limitation, ground water well drilling or any action that will alter, disturb or otherwise interfere with the remedial work that has been performed on the Property, which is more particularly described in the BRES Site Work Plan attached as Exhibit B hereto (the "Remedial Work").
  2. Maintenance. In order to protect and preserve the Remedial Work performed on the Property, the Property Owner will keep the Property in good repair, normal wear and tear expected, and will notify BSB of any problems that may arise with the remedial Work.
  3. Sale, Lease, or Other Conveyance. The Property Owner will disclose the nature of the Remedial Work performed on the Property and the terms of these Covenants to any future purchaser, lessee or other occupant of the Property. If the Property Owner sells, leases, or otherwise conveys any portion of his/her right, title or interest in any portion of the Property, the Covenants set forth herein shall be included in or attached to the deed, lease or other conveyance documents. The Property Owner shall also notify BSB of any sale, lease, or other conveyance of the Property.
  3. Obligation to Comply with Residential Access Agreement. The terms and conditions of that certain BRES Access Agreement dated \_\_\_\_\_ shall be binding upon the Property Owners, successors, and assigns and all future purchasers, lessees, or other occupants of the Property. A copy of the BRES Access Agreement may be obtained from BSB upon request.
- B. BENEFITED PROPERTIES - BENEFITS. The Benefited Properties shall include all properties adjacent to or contiguous with the Property. The benefits from the Covenants include: (i) the reduction or minimization of potential risk associated with environmental conditions on, or, under, near, or associated with the Property, and (ii) the maintenance, use, and potential development of the Property in such a manner to allow economic benefits to accrue to the Benefited Properties.
- C. ENFORCEMENT RIGHTS - COVENANTS. BSB, EPA, MDEQ, Atlantic Richfield Company and each of the Owners (as the same may appear from time to time) of the Benefited Properties shall have the right, but not the obligation, to enforce the Covenants.



Each Covenant shall be enforceable, in perpetuity, to the fullest extent permitted by Montana law. All remedies available, at law, or in equity, shall be available for the enforcement of the Covenants. The selection of remedies shall be within the sole discretion of the party entitled to enforce the Covenants. The prevailing party in any action to enforce the Covenants shall be entitled to reasonable attorney's fees and costs incurred in such action.



**EXHIBIT B TO NOTICE OF COVENANTS**

**BRES SITE WORK PLAN**



#### **Appendix H.4 Agency Enforcement Letters**

BRES Access and Maintenance

BRES Access and Inspection

RMAP Residential Access





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 8, MONTANA OFFICE

FEDERAL BUILDING, 10 West 15<sup>TH</sup> Street, Suite 3200  
Helena, MT 59626-0096  
Phone 866-457-2690  
www.epa.gov/region8

Ref: 8 ORC-LEP/MO

**DRAFT**

9/16/2019 EPA

DATE

**URGENT: FINAL OPPORTUNITY. PLEASE READ AND RESPOND.**

Ref: 8EPR-SR

NAME

ADDRESS

CITY, STATE, ZIP

Re: PROPERTY LEGAL DESCRIPTION: \_\_\_\_\_

Dear Property Owner:

The U.S. Environmental Protection Agency (EPA) has been informed by Butte Silver Bow County that a mine waste cap and/or Superfund storm water structure on your property is in need of repair *or* is not being used appropriately by you. The cap/structure was implemented pursuant to the federal Superfund law known as the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Under CERCLA, mine waste caps/structures are required to be maintained periodically *or* must not be used for grazing *etc.* to ensure that the caps are stable, vegetation is adequate to allow for cap stability, and structures are maintained.

You were previously contacted by (Butte Silver Bow County) *or* (the Atlantic Richfield Company) for such repairs *or* regarding such land use issues in letters dated \_\_\_\_\_. An affirmative reply to those requests has not been received.

**This is your final opportunity to provide voluntary access for repair and/or to commit you will refrain from the any inappropriate land use so that the cap stability can be maintained as required by CERCLA. If you do not provide an affirmative response regarding your property by \_\_\_\_\_, you may be directly responsible for any future cleanup, restoration or maintenance of the cap.**

The cap/structure repair *or* land use restriction will protect human health and meet objectives of the final remedy as defined in the EPA's Butte Priority Soils Record of Decision as amended. If the EPA is unable to obtain the needed repairs *or* confirm appropriate land use for the cap, a copy of this letter will be recorded by EPA or the State of Montana in the chain of title for your property in the Butte-Silver Bow County real property records to inform future potential owners of your property that remediation of existing mine waste on the property has not been appropriately maintained as required by CERCLA.

To respond affirmatively to this notice, please call an EPA representative at \_\_\_\_\_ or return the enclosed form in the postage-paid return envelope **to the EPA by \_\_\_\_\_.**



After the inspection is complete, you will receive a letter from the Butte Silver Bow County documenting the result of the inspection. Thank you for considering this opportunity. Please contact the Nikia Greene at 406 457-5019 if you have any questions or concerns.

Sincerely,

Site Attorney, BPSOU

Enclosures: Access form and return envelope





**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 8, MONTANA OFFICE**

FEDERAL BUILDING, 10 West 15<sup>TH</sup> Street, Suite 3200  
Helena, MT 59626-0096  
Phone 866-457-2690  
www.epa.gov/region8

Ref: 8 ORC-LEP/MO

**DRAFT**

9/16/2019 EPA

DATE

**URGENT: FINAL OPPORTUNITY. PLEASE READ AND RESPOND.**

Ref: 8EPR-SR

NAME

ADDRESS

CITY, STATE, ZIP

Re: PROPERTY LEGAL DESCRIPTION: \_\_\_\_\_

Dear Property Owner:

The U.S. Environmental Protection Agency (EPA) requests access to your property to enable the inspection *or* repair of a previously placed mine waste cap on your property. The mine waste cap was placed on your property pursuant to the federal Superfund law known as the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Under CERCLA law, mine waste caps are required to be inspected periodically to ensure that the caps are stable and vegetation is adequate to allow for cap stability.

You were previously contacted by (Butte Silver Bow County) *or* (the Atlantic Richfield Company) for such access in letters dated \_\_\_\_\_. An affirmative reply to those requests has not been received.

**This is your final opportunity to provide voluntary access so that the cap inspection *or* repair can occur as required by CERCLA. If you do not provide access to your property by \_\_\_\_\_, you may be responsible for any future cleanup or maintenance of the cap.**

The cap inspection will protect human health and meet objectives of the final remedy as defined in the EPA's Butte Priority Soils Record of Decision as amended. If the EPA is unable to complete the investigation of your property *or* the repair of the mine waste cap on your property, a copy of this letter will be recorded by EPA or the State of Montana in the chain of title for your property in the Butte-Silver Bow County real property records the status of your property will be recorded and maintained by Butte Silver Bow County and the State of Montana to inform future potential owners of your property that existing mine waste on the property has not been appropriately remediated from existing mine waste on your property.

To grant access for investigation of your property, please call an EPA representative at \_\_\_\_\_ or return the enclosed access form in the postage-paid return envelope **to the EPA by \_\_\_\_\_.** **We will attempt to schedule the cap inspection *or* repair at a time that is convenient for you; however, it must be scheduled by \_\_\_\_\_.**



After the inspection is complete, you will receive a letter from the Butte Silver Bow County documenting the result of the inspection. Thank you for considering this opportunity. Please contact the Nikia Greene at 406 457-5019 if you have any questions or concerns.

Sincerely,

Site Attorney, BPSOU

Enclosures: Access form and return envelope





**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 8, MONTANA OFFICE**

FEDERAL BUILDING, 10 West 15<sup>TH</sup> Street, Suite 3200  
Helena, MT 59626-0096  
Phone 866-457-2690  
www.epa.gov/region8

Ref: 8 ORC-LEP/MO

**DRAFT**

9/16/2019 EPA

DATE

**URGENT: FINAL OPPORTUNITY. PLEASE READ AND RESPOND.**

Ref: 8EPR-SR

NAME

ADDRESS

CITY, STATE, ZIP

Re: PROPERTY LEGAL DESCRIPTION: \_\_\_\_\_

Dear Property Owner:

The U.S. Environmental Protection Agency (EPA) requests access to your property for environmental assessment, including the collection and analysis of samples of exterior yard soils, interior living space dust and attic dust if exposure pathways are identified. These activities are components of the Multi-Pathway Residential Metals Abatement Program (RMAP) which is designed to mitigate potentially harmful residential exposures to sources of lead, arsenic and mercury contamination. The RMAP is being implemented pursuant to EPA's authority under the federal Superfund law known as the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

You were previously contacted by (Butte Silver Bow County) *or* (the Atlantic Richfield Company) for such access in letters dated \_\_\_\_\_. An affirmative reply to those requests has not been received.

**This is your final opportunity to provide voluntary access to your residential property so that the environmental assessment and abatement activities, if required, can occur as required by CERCLA. If you do not provide access to your property by \_\_\_\_\_, you may be responsible for any future assessment and cleanup of your property.**

Assessment and abatement actions, if indicated by the sampling results collected during the initial assessment, will protect human health and meet objectives of the final remedy as defined in the EPA's Butte Priority Soils Record of Decision, as amended. If the EPA is unable to complete the investigation of your property, a copy of this letter will be recorded by be advised that EPA or the State of Montana have authority to and will consider recording a copy of this letter in the chain of title for your property in the Butte-Silver Bow County real property records. The purpose of such recording is to inform future potential owners of your property that your existing mine waste on the property has not been assessed and appropriately remediated, as indicated by the results of sampling conducted in the course of the RMAP assessment.



To grant access for assessment of your property, please call an EPA representative at \_\_\_\_\_ or return the enclosed access form in the postage-paid return envelope **to the EPA by \_\_\_\_\_ . We will attempt to schedule the RMAP inspection and future abatement activities, if required based upon the results of the initial environmental assessment activities, at a time that is convenient for you; however, the assessment and sampling of your property must be scheduled by \_\_\_\_\_ .**

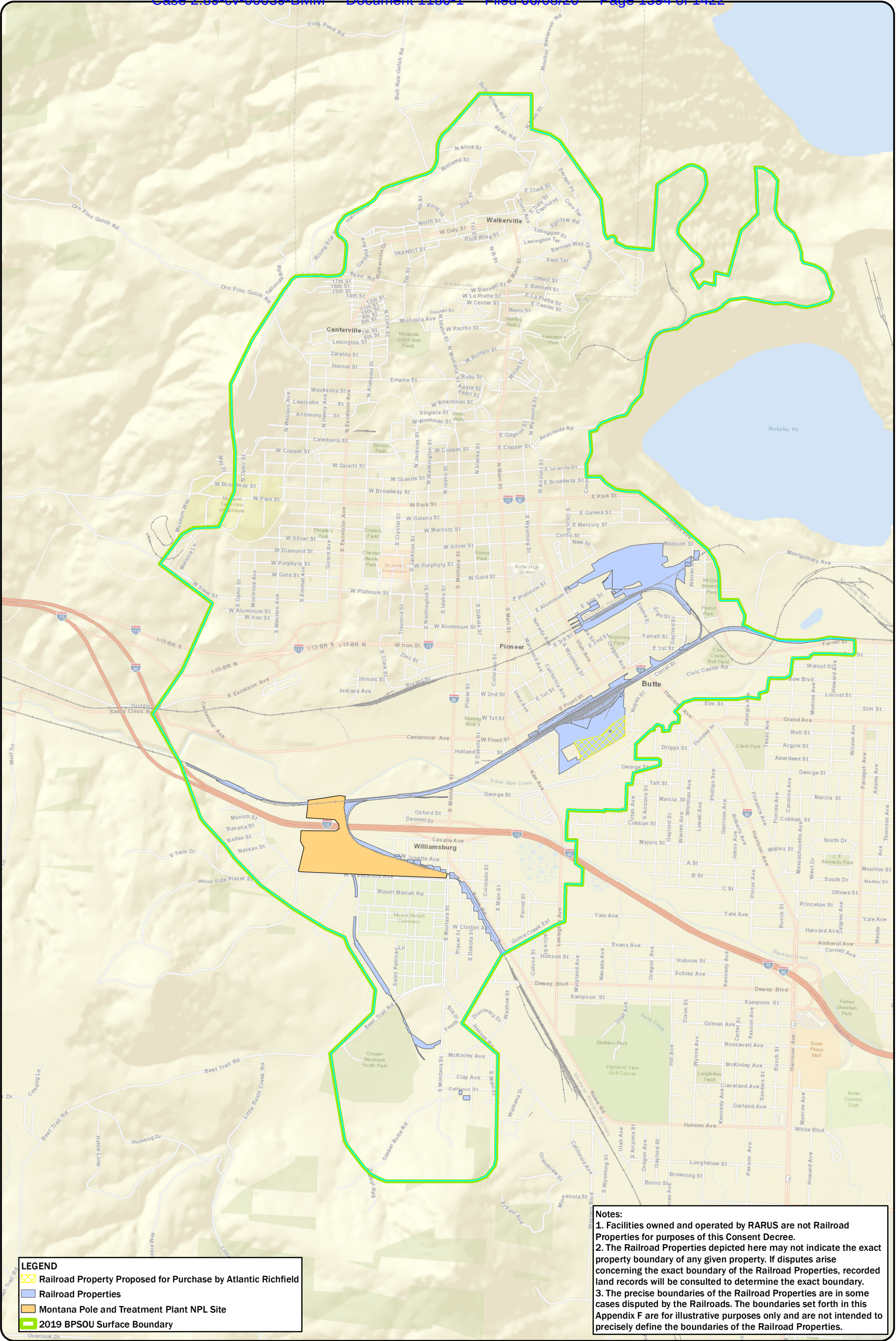
After the inspection and assessment of your property is complete, including the receipt of any sampling results, you will receive a letter from the Butte Silver Bow County documenting the results of the environmental assessment inspection. Thank you for considering this opportunity. Please contact the Nikia Greene at 406 457-5019 if you have any questions or concerns.

Sincerely,

Site Attorney, BPSOU

Enclosures: Access form and return envelope



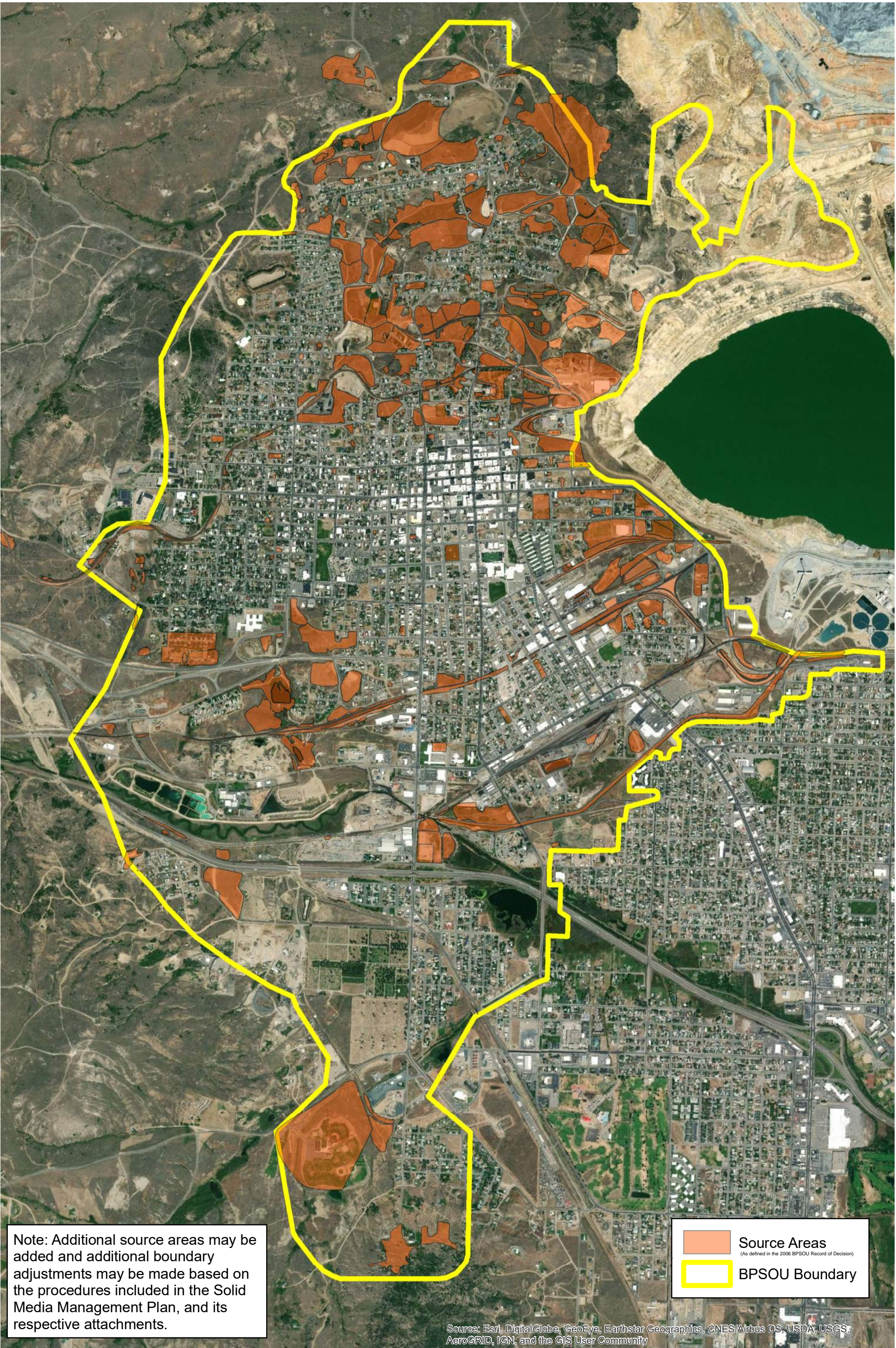




**MAP OF SOURCE AREAS**  
**for the**  
**BUTTE PRIORITY SOILS OPERABLE UNIT**  
**of the**  
**SILVER BOW CREEK / BUTTE AREA SUPERFUND**  
**SITE**  
**Butte-Silver Bow County, Montana**

**APPENDIX G**  
**TO THE CONSENT DECREE**







**BLACKTAIL CREEK RIPARIAN ACTIONS  
OUTLINE**

**for the  
BUTTE PRIORITY SOILS OPERABLE UNIT  
of the  
SILVER BOW CREEK / BUTTE AREA  
SUPERFUND SITE  
Butte-Silver Bow County, Montana**

**APPENDIX H  
TO THE CONSENT DECREE**



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**TABLE OF CONTENTS**

<b>1.0</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	Purpose of the Outline .....	1
1.2	Structure of the Outline.....	1
1.3	Scope of the Remedy .....	1
1.4	BPSOU Site Decision Documents .....	1
1.5	Definitions and Abbreviations .....	2
<b>2.0</b>	<b>COMMUNITY INVOLVEMENT .....</b>	<b>3</b>
2.1	Community Involvement Responsibilities.....	3
<b>3.0</b>	<b>REMEDIAL DESIGN .....</b>	<b>4</b>
3.1	RD Work Plan.....	4
3.2	Access .....	4
3.3	Project Coordinator/Periodic Meetings.....	4
3.4	Pre-Design Investigations .....	5
3.5	Preliminary (30%) RDs.....	5
3.6	Intermediate (60%) RDs .....	6
3.7	Pre-Final (95%) RDs.....	6
3.8	Final (100%) RDs .....	6
<b>4.0</b>	<b>REMEDIAL ACTION .....</b>	<b>7</b>
4.1	RA Work Plans .....	7
4.2	Implementation and Construction of elements included in the Remedial Designs ..	7
4.3	Meetings and Inspections.....	7
4.4	Emergency Response and Reporting .....	8
4.5	Off-Site Shipments.....	9
4.6	RA Completion .....	9
4.7	Certification of BTC Riparian Actions Completion .....	10
<b>5.0</b>	<b>REPORTING .....</b>	<b>12</b>
5.1	Progress Reports .....	12
5.2	Notice of Progress Report Schedule Changes. ....	12
<b>6.0</b>	<b>DELIVERABLES .....</b>	<b>13</b>
6.1	Applicability .....	13
6.2	In Writing.....	13
6.3	General Requirements for Deliverables.....	13
6.4	Technical Specifications .....	13
6.5	Certification .....	14
6.6	Approval of Deliverables.....	14
6.7	Supporting Deliverables.....	15
<b>7.0</b>	<b>SETTLING DEFENDANTS' PARTICIPATION .....</b>	<b>17</b>
7.1	Copies .....	17
7.2	Review and Comment by SDs .....	17
<b>8.0</b>	<b>SCHEDULES .....</b>	<b>18</b>
8.1	Applicability and Revisions.....	18
8.2	RD Schedule for the Further Remedial Elements.....	18



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**9.0 REFERENCES.....19**  
9.1 Regulations and Guidance Documents .....19  
9.2 EPA Web Pages .....20  
9.3 Other Regulations and Guidance .....20

**LIST OF EXHIBITS**

Exhibit 1 Cost Determination for Load, Haul, and Dump of Blacktail Creek Waste Materials



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **1.0 INTRODUCTION**

### **1.1 Purpose of the Outline**

This Outline sets forth the procedures and requirements for implementing the BTC Riparian Actions to be implemented by the Montana Department of Environmental Quality (DEQ) on behalf of the State of Montana.

### **1.2 Structure of the Outline**

- (a) Section 2 (Community Involvement) sets forth EPA's and DEQ's responsibilities for community involvement.
- (b) Section 3 (Remedial Design) sets forth the process for developing the RD, which includes the submission of specified primary deliverables.
- (c) Section 4 (Remedial Action) sets forth requirements regarding the completion of the RA, including primary deliverables related to completion of the RA.
- (d) Section 5 (Reporting) sets forth DEQ's reporting obligations.
- (e) Section 6 (Deliverables) describes the content of the supporting deliverables and the general requirements regarding DEQ's submission of, and EPA's review of, approval of, comment on, and/or modification of, the deliverables.
- (f) Section 7 (Settling Defendants' Participation) addresses Settling Defendants' participation.
- (g) Section 8 (Schedules) sets forth the schedule for submitting the primary deliverables, specifies the supporting deliverables that must accompany each primary deliverable, and sets forth the schedule of milestones regarding the completion of the RA.
- (h) Section 9 (References) provides a list of references, including URLs.

### **1.3 Scope of the Remedy**

The Scope of the BTC Riparian Actions are described in Section 5 of Attachment C to the BPSOU Statement of Work (BPSOU SOW), Blacktail Creek Remediation and Contaminated Groundwater Hydraulic Control Remedial Elements (hereinafter, Section 5 of Attachment C) and restoration work integrated with the Remedy at the Confluence Area, and include only those actions delineated as DEQ responsibilities. DEQ is not obligated to attain groundwater or in-stream surface water ARAR standards, but is obligated to attain construction-related performance standards.

### **1.4 BPSOU Site Decision Documents**

- (a) 2006 BPSOU ROD – Record of Decision, Butte Priority Soils Operable Unit, September 2006.
- (b) 2011 ESD - Explanation of Significant Differences to the 2006 Butte Priority Soils Operable Unit Record of Decision, July 2011.
- (c) 2020 ROD Amendment, February 2020.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**1.5 Definitions and Abbreviations**

The terms used in this Outline that are defined in CERCLA, in regulations promulgated under CERCLA, or in the Consent Decree (CD), have the meanings assigned to them in CERCLA, in such regulations, or in the CD, except that the term “Paragraph” or “¶” used in this document means a paragraph of the Outline, and the term “Section” used in this document means a section of the Outline, unless otherwise stated.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## 2.0 COMMUNITY INVOLVEMENT

### 2.1 Community Involvement Responsibilities

- (a) EPA has the lead responsibility for developing and implementing community involvement activities at the Butte Site. EPA developed a Community Involvement Plan (CIP) in 2003 for the Site and updated the CIP again in 2013. Pursuant to 40 C.F.R. § 300.435(c), EPA shall review the existing CIP and determine whether it should be revised to describe further public involvement activities during the BTC Riparian Actions that are not already addressed or provided for in the existing CIP. Butte Citizens Technical Environmental Committee (CTEC) has been funded by a Technical Assistance Grant since the late 1980s and its continuing role will be addressed in any revised CIP.
- (b) If requested by EPA, DEQ shall participate in community involvement activities, including participation in (1) the preparation of information regarding the BTC Riparian Actions for dissemination to the public, with consideration given to including mass media and/or internet notification, and (2) public meetings that may be held or sponsored by EPA to explain activities at or relating to the Butte Site regarding the BTC Riparian Actions. DEQ's support of EPA's community involvement activities may also include providing online access to initial submissions and updates of deliverables relating to the BTC Riparian Actions to:
  - (i) Any Community Advisory Groups,
  - (ii) Any Technical Assistance Grant recipients and their advisors, and
  - (iii) Other entities named by EPA to provide them with a reasonable opportunity for review and input. All community involvement activities conducted by DEQ at EPA's request are subject to EPA's oversight. EPA previously provided on-site administrative records for the 2006 ROD and the 2011 ESD. EPA shall maintain an on-site administrative record for the 2020 Record of Decision Amendment at the local document repository designated for that administrative record which is Montana Tech Library, 1300 W. Park Street, Butte MT 59701. That repository shall also house the ongoing record of documents generated under this Outline, and all deliverables required under this Outline shall be copied to this address. DEQ shall also send a copy of any document or record generated under this Outline to the CTEC offices in Butte, P.O. Box 593, Butte, MT 59703.
- (c) **DEQ's Community Involvement Coordinator.** If requested by EPA, DEQ shall, within 15 days of a request, designate and notify EPA of DEQ's Community Involvement Coordinator (DEQ's CI Coordinator). DEQ may hire a contractor for this purpose. DEQ's notice must include the name, title, and qualifications of the DEQ's CI Coordinator. DEQ's CI Coordinator is responsible for providing support regarding EPA's community involvement activities, including coordinating with EPA's CI Coordinator regarding responses to the public's inquiries to EPA about the BTC Riparian Actions.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

### **3.0 REMEDIAL DESIGN**

#### **3.1 RD Work Plan**

The obligations described below apply only to BTC Riparian Actions

- (a) DEQ shall submit Remedial Design (RD) Work Plans (RDWP) for EPA approval for BTC Riparian Actions. A copy of all RD deliverables will be provided to SDs' Project Coordinator at the same time such plans are delivered to EPA for SDs' review and comment. DEQ will consider SDs' comments, if submitted in a timely manner, and shall incorporate or attempt to resolve all comments submitted by SDs.
- (b) The RDWP must include:
  - (1) Plans for implementing all RD activities identified in this Outline, or required by EPA to be conducted to develop the RD;
  - (2) A description of the overall management strategy for performing the RD, including a proposal for phasing of design and construction, if applicable;
  - (3) A description of the proposed general approach to contracting, construction, operation, maintenance, and monitoring of the Remedial Action (RA) necessary to implement the BTC Riparian Actions;
  - (4) A description of the responsibility and authority of all organizations and key personnel involved with the development of the RD;
  - (5) Descriptions of any areas requiring clarification and/or anticipated problems (e.g., data gaps);
  - (6) Description of any proposed pre-design investigation;
  - (7) Description of any proposed treatability study (if required); and
  - (8) Appropriate reference to the following supporting deliverables described in ¶ 6.7(Supporting Deliverables): Health and Safety Plan; Emergency Response Plan; Quality Assurance Project Plans; and Interim Operation, Monitoring and Maintenance Plans.

#### **3.2 Access**

DEQ shall obtain access for any third-party properties needed for the BTC Riparian Actions.

#### **3.3 Project Coordinator/Periodic Meetings**

DEQ shall name a Project Coordinator (who represents all State party interests) with appropriate qualifications for directing BTC Riparian Actions, including actions within the Confluence Area, and shall notify EPA of the name and qualifications within 90 days of the Effective Date. During the RD process, DEQ shall meet regularly with EPA to discuss design issues as necessary, as directed or determined by EPA. SDs Project Coordinator will receive notice of meetings other than day to day phone calls or informal consultation, provided by EPA, and may participate.

#### **3.4 Pre-Design Investigations**

The purpose of the Pre-Design Investigation (PDI) is to address data gaps by conducting additional field investigations. Several investigations are identified in



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

Section 5 of Attachment C and will be identified in the RDWP, and it is anticipated that additional data gaps may be identified during design that require investigation. The following presents general requirements for pre-design investigations.

- (a) **PDI Work Plan.** DEQ shall submit a PDI Work Plan (PDIWP) for EPA approval. The PDIWP must include:
  - (1) An evaluation and summary of existing data and description of data gaps;
  - (2) A sampling plan including media to be sampled, contaminants or parameters for which sampling will be conducted, location (areal extent and depths), and number of samples; and
  - (3) Cross references to quality assurance/quality control (QA/QC) requirements set forth in the approved Quality Assurance Project Plan QAPP.
- (b) Following the PDI, DEQ shall submit a PDI Evaluation Report, for EPA approval. This report must include:
  - (1) Summary of the investigations performed;
  - (2) Summary of investigation results;
  - (3) Summary of validated data (i.e., tables and graphics);
  - (4) Data validation reports and laboratory data reports;
  - (5) Narrative interpretation of data and results;
  - (6) Results of statistical and modeling analyses;
  - (7) Photographs documenting the actions conducted; and
  - (8) Conclusions and recommendations for RD, including design parameters and criteria, and including an acceptable repository provided by the SDs as a disposal location.
  - (9) EPA may require DEQ to supplement the PDI Evaluation Report and/or to perform additional pre-design studies.

### 3.5 Preliminary (30%) RDs

DEQ shall submit a Preliminary (30%) RD for EPA's comment. The Preliminary RD must include:

- (a) A design criteria report, as described in the *Remedial Design/Remedial Action Handbook*, EPA 540/R-95/059 (June 1995);
- (b) Preliminary *drawings* and specifications;
- (c) A description of how the RA will be implemented in a manner that minimizes environmental impacts in accordance with EPA's *Principles for Greener Cleanups* (Aug. 2009);
- (d) A description of monitoring and control measures to protect human health and the environment, such as air monitoring and dust suppression, and a de-watering plan, during the RA;
- (e) Any proposed revisions to the RA Schedule that is set forth in ¶ 7.3 (RA Schedule);
- (f) A preliminary monitoring and maintenance manual that describes procedures for monitoring and repair, as necessary, of vegetation to attain construction performance standards and certify remedy work is operational and functional



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

as to construction-related performance standards, including quantitative measures of vegetation performance; and

- (g) Updates of all supporting deliverables required to accompany the RDWP.

**3.6 Intermediate (60%) RDs**

DEQ shall submit the Intermediate (60%) RD for EPA's comment. The Intermediate RD must:

- (a) Be a continuation and expansion of the Preliminary RD;
- (b) Address EPA's comments regarding the Preliminary RD; and
- (c) Include the same elements as are required for the Preliminary (30%) RD.

**3.7 Pre-Final (95%) RDs**

DEQ shall submit the Pre-final (95%) RD for EPA's comment. The Pre-final RD must be a continuation and expansion of the previous design submittal and must address EPA's comments regarding the Intermediate RD. The Pre-final RD will serve as the approved Final (100%) RD if EPA approves the Pre-final RD without comments. The Pre-final RD must include:

- (a) A complete set of construction drawings and specifications that are:
  - (1) Certified by a registered professional engineer;
  - (2) Suitable for procurement; and
  - (3) Follow the most current edition of the Construction Specifications Institute's Master Format;
- (b) A survey and engineering drawings showing existing BTC Riparian Area features, such as elements, property borders, easements, and Site conditions;
- (c) Pre-Final versions of the same elements and deliverables as are required for the Preliminary/Intermediate RD;
- (d) A specification for photographic documentation of the RA; and
- (e) Updates of all supporting deliverables required to accompany the Preliminary (30%) RD.

**3.8 Final (100%) RDs**

DEQ shall submit the Final (100%) RD for EPA approval. The Final RD must address EPA and SD comments on the Pre-final RD and must include final versions of all Pre-final RD deliverables.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

#### 4.0 REMEDIAL ACTION

##### 4.1 RA Work Plans

The obligations described in Section 4.0 apply to BTC Riparian Actions only.

- (a) DEQ shall submit a BTC Riparian Action Remedial Action Work Plan (BTC RARAWP) for EPA approval. DEQ may provide the BTC RARAWP to EPA concurrently with DEQ's Final (100%) RD. A copy of all RA deliverables will be provided to SDs' Project Coordinator at the same time such plans are delivered to EPA for SD's review and comment. DEQ will consider SDs' input, if submitted in a timely manner, and DEQ shall incorporate or attempt to resolve all comments submitted by SDs.
- (b) The RARA WP must include:
  - (1) A proposed RA Construction Schedule in a Gantt chart;
  - (2) DEQ's designation under Subparagraph 20.g(i) of the Consent Decree of the approved repository for BTC Waste Materials (Exhibit 1);
  - (3) Proposed dewatering plans, and proposed use of BTL for management of construction water, haul routes and timing for repository access for coordination with SDs project work;
  - (4) If necessary, an updated health and safety plan that covers activities during the RA; and
  - (5) Plans for satisfying the substantive requirements of permits for on-site activity.

##### 4.2 Implementation and Construction of elements included in the Remedial Designs

DEQ shall perform and implement all activities included in the approved Final (100%) Remedial Designs and as described in the BTC RARAWP. Requests for Changes (RFCs) describing proposed changes that are necessary from the Final Remedial Designs and/or the BTC RARAWP will be submitted by DEQ for EPA approval, with a copy provided concurrently to the SDs' Project Coordinator.

##### 4.3 Meetings and Inspections

- (a) **Preconstruction Conference.** Before performing any BTC Riparian Actions required of DEQ in Section 5 of Attachment C, DEQ shall hold a preconstruction conference with EPA and others as directed or approved by EPA and as described in the *Remedial Design/Remedial Action Handbook*, EPA 540/R-95/059 (June 1995). DEQ shall provide SDs representatives notice of the preconstruction conference and SDs may participate. DEQ shall prepare an agenda and minutes of the conference and shall distribute an agenda prior to the conference and the minutes after the conference to all Parties.
- (b) **Periodic Meetings.** During the construction portion of the RA (RA Construction), DEQ shall meet weekly with EPA and others as directed or determined by EPA, to discuss construction issues. DEQ shall meet with the SDs during the construction portion as needed to discuss construction issues,



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

including construction schedules. DEQ shall distribute an agenda and list of attendees to all participants prior to each meeting. DEQ shall prepare minutes of the meetings and shall distribute the minutes to all participants.

(c) **Inspections.**

- (1) EPA or its contractor shall conduct periodic inspections of the BTC Riparian Actions. At EPA's request, the Supervising Contractor or other designee shall accompany EPA or its contractor during inspections.
- (2) If needed: DEQ shall provide personal protective equipment needed for EPA personnel and any oversight officials to perform their oversight duties.
- (3) Upon notification by EPA of any deficiencies in the RA Construction, DEQ shall take all necessary steps to correct the deficiencies and/or bring the RA Construction into compliance with the approved Final RD, any approved design changes, and/or the approved BTC RARAWP. If applicable, DEQ shall comply with any schedule provided by EPA in its notice of deficiency.

#### 4.4 Emergency Response and Reporting

- (a) **Emergency Response and Reporting.** If any event occurs during performance of the BTC Riparian Actions that causes or threatens to cause a release of Waste Material on, at, or from the BTC Area and that either constitutes an emergency situation or that may present an immediate threat to public health or welfare or the environment, DEQ shall:
  - (1) Immediately take all appropriate action to prevent, abate, or minimize such release or threat of release;
  - (2) Immediately notify the authorized EPA officer (as specified in ¶) orally; and
  - (3) Take such actions in consultation with the authorized EPA officer and in accordance with all applicable provisions of the applicable Health and Safety Plan, the applicable Emergency Response Plan, and any other deliverable approved by EPA under the WP.
- (b) **Release Reporting.** Upon the occurrence of any event during performance of the BTC Riparian Actions that DEQ is required to report pursuant to Section 103 of CERCLA, 42 U.S.C. § 9603, or Section 304 of the Emergency Planning and Community Right-to-know Act (EPCRA), 42 U.S.C. § 11004, DEQ shall immediately notify the authorized EPA officer orally.
- (c) The “authorized EPA Remedial Project Manager (RPM)” for purposes of immediate oral notifications and consultations under ¶ 4.4 is the EPA RPM, the EPA Alternate RPM (if the EPA RPM is unavailable), or the EPA Emergency Response Unit, Region 8 (if neither EPA RPM is available).
- (d) For any event covered by ¶ 4.4, DEQ shall:
  - (1) Within 14 days after the onset of such event, submit a report to EPA describing the actions or events that occurred and the measures taken, and to be taken, in response thereto; and
  - (2) Within 30 days after the conclusion of such event, submit a report to EPA describing all actions taken in response to such event.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- (e) The reporting requirements under ¶ 4.4 are in addition to the reporting required by CERCLA § 103 or EPCRA § 304.

#### **4.5 Off-Site Shipments**

- (a) DEQ may ship hazardous substances, pollutants, and contaminants from the Site to an off-Site facility only if they comply with Section 121(d)(3) of CERCLA, 42 U.S.C. § 9621(d)(3), and 40 C.F.R. § 300.440. DEQ will be deemed to be in compliance with CERCLA § 121(d)(3) and 40 C.F.R. § 300.440 regarding a shipment if DEQ obtains a prior determination from EPA that the proposed receiving facility for such shipment is acceptable under the criteria of 40 C.F.R. § 300.440(b).
- (b) DEQ may ship Waste Material from the BTC Area to an out-of-state waste management facility only if, prior to any shipment, they provide notice to the appropriate state environmental official in the receiving facility's state and to the EPA Project Coordinator. This notice requirement will not apply to any off-Site shipments when the total quantity of all such shipments does not exceed 10 cubic yards. The notice must include the following information, if available:
- (1) The name and location of the receiving facility;
  - (2) The type and quantity of Waste Material to be shipped;
  - (3) The schedule for the shipment; and
  - (4) The method of transportation. DEQ also shall notify the state environmental official referenced above and the EPA Project Coordinator of any major changes in the shipment plan, such as a decision to ship the Waste Material to a different out-of-state facility. DEQ shall provide the notice after the award of the contract for RA construction and before the Waste Material is shipped.
  - (5) DEQ may ship Investigation Derived Waste (IDW) from the Site to an off-Site facility only if they comply with Section 121(d)(3) of CERCLA, 42 U.S.C. § 9621(d)(3), 40 C.F.R. § 300.440, EPA's Guide to Management of Investigation Derived Waste, OSWER 9345.3-03FS (Jan. 1992), and any IDW-specific requirements contained in the ROD. Wastes shipped off-Site to a laboratory for characterization, and RCRA hazardous wastes that meet the requirements for an exemption from RCRA under 40 CFR § 261.4(e) shipped off-site for treatability studies, are not subject to 40 C.F.R. § 300.440.

#### **4.6 RA Completion**

DEQ shall complete a draft Certification of Completion for the BTC Riparian Actions, in accordance with EPA regulations and guidance, upon completion of all construction and upon attaining all BTC Riparian Actions Performance Standards (which do not include groundwater ARAR or in-stream surface water ARAR standards but do include reclamation and revegetation ARARs, including quantitative measures of vegetation performance) for a period of at least 1 year. DEQ may submit, and EPA and DEQ may jointly approve, the Certification of Completion for the BTC Riparian Actions before SDs issue or EPA approves the KRECCR. The draft certification shall be subject to review and comment by EPA.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

DEQ shall provide a copy of the draft certification to SDs and SDs may review and timely provide comments to EPA and DEQ.

- (a) DEQ shall attempt to incorporate or resolve all EPA's and SDs' comments, and shall notify EPA and SDs of the disposition of their comments prior to completing the final document. As outlined in ¶6.6 below, any disputes between DEQ and EPA concerning EPA comments, requests for additional response actions, or approvals are subject to the dispute resolution procedures as provided for in the Butte Site SMOA. Any disputes between DEQ, EPA and SDs concerning EPA comments, requests for additional response actions, or approvals are subject to the dispute resolution provisions of the Consent Decree found at Paragraphs 72 through 75.
- (b) If EPA and DEQ jointly determine that the BTC Riparian Actions have been completed in conformity with the Consent Decree, the Outline and the Butte Site SMOA (including obtaining BTC Riparian Actions Performance Standards for reclamation and revegetation), then EPA and the State shall jointly issue the final Certification of Completion of the BTC Riparian Actions. As outlined in ¶ 6.6 below, if EPA disagrees with DEQ assertion that the BTC Riparian Actions have been completed in conformity with the Consent Decree, the Outline and the Butte Site SMOA, such a determination is subject to the dispute resolution provisions of the Butte Site SMOA. If SDs disagree with EPA's and/or DEQ's assertion that the BTC Riparian Actions have been completed in conformity with the Consent Decree, including the Outline, such a determination is subject to the dispute resolution provisions of the Consent Decree found at Paragraphs 72 through 75.

#### 4.7 Certification of BTC Riparian Actions Completion

- (a) **BTC Riparian Actions Completion Inspection.** Upon completion of all BTC Riparian Actions, DEQ shall schedule an inspection for the purpose of obtaining EPA's Certification of BTC Riparian Actions Completion. The inspection must be attended by DEQ and EPA and/or their representatives. DEQ will provide SDs Project Coordinator notice of the inspection and SDs' representatives may attend.
- (b) **BTC Riparian Actions Completion Report.** Following the inspection, DEQ shall submit a report to EPA requesting EPA's Certification of BTC Riparian Actions Completion. If appropriate, DEQ may submit this request to EPA concurrent with ¶4.6(b) above. DEQ may submit the request for EPA's Certification of BTC Riparian Actions prior to SDs submittal or EPA approval the KRECCR. The report must:
  - (1) Include certifications by a registered professional engineer and by DEQ' Project Coordinator that the BTC Riparian Actions, are complete; and
  - (2) Be certified in accordance with ¶ 6.5. (Certification).
- (c) If EPA concludes that the BTC Riparian Actions are not complete, EPA shall so notify DEQ. EPA's notice must include a description of and schedule for the activities that DEQ must perform to complete the BTC Riparian Actions. EPA's notice must include specifications and a schedule for such activities or



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

must require DEQ to submit specifications and a schedule for EPA approval. DEQ shall perform all activities described in the notice or in the EPA-approved specifications and schedule.

- (d) If EPA concludes, based on the initial or any subsequent report requesting Certification of BTC Riparian Actions Completion, that the BTC Riparian Actions are complete, EPA shall so certify in writing to DEQ. EPA may issue such Certification to DEQ prior to SD submittal or EPA approval of the KRECCR. Thereafter SDs shall be responsible for monitoring and maintenance of the BTC Riparian Actions per an approved O&M Plan. Disputes between DEQ and EPA concerning EPA's approval are subject to the dispute resolution procedures of the subject Butte Site SMOA. Disputes between SDs, EPA and DEQ concerning EPA's approval are subject to the dispute resolution procedures of the Consent Decree found at Paragraphs 72 through 75.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **5.0 REPORTING**

### **5.1 Progress Reports**

Commencing with the month following lodging of the CD and until EPA approves the BTC Riparian Actions RA Completion, DEQ shall submit quarterly progress reports to EPA, or as otherwise requested by EPA. The reports must cover all activities that took place during the prior reporting period, including:

- (a) The actions that have been taken toward achieving compliance with the CD;
- (b) A summary of all results of sampling, tests, and all other data received or generated by DEQ;
- (c) A description of all deliverables that DEQ submitted to EPA;
- (d) A description of all activities relating to RA Construction that are scheduled for the next six weeks;
- (e) An updated RA Construction Schedule, together with information regarding percentage of completion, delays encountered or anticipated that may affect the future schedule for implementation of the BTC Riparian Actions, and a description of efforts made to mitigate those delays or anticipated delays;
- (f) A description of any modifications to the work plans or other schedules that DEQ has proposed or that have been approved by EPA; and
- (g) A description of all activities undertaken in support of the CIP during the reporting period and those to be undertaken in the next six weeks.

### **5.2 Notice of Progress Report Schedule Changes.**

If the schedule for any activity described in the Progress Reports, including activities required to be described under ¶ 5.1, changes, DEQ shall notify EPA of such change at least 7 days before performance of the activity.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## **6.0 DELIVERABLES**

### **6.1 Applicability**

DEQ shall submit deliverables for EPA approval or for EPA and SD comment as specified in the Outline and the CD. If neither is specified, the deliverable does not require EPA's approval or comment. Paragraphs 6.2 (In Writing) through 6.4 (Technical Specifications) apply to all deliverables. Paragraph 6.5 (Certification) applies to any deliverable that is required to be certified. Paragraph 6.6 (Approval of Deliverables) applies to any deliverable that is required to be submitted for EPA approval.

### **6.2 In Writing**

As provided in Paragraph 113 of the CD, all deliverables under this Outline must be in writing unless otherwise specified.

### **6.3 General Requirements for Deliverables**

All deliverables must be submitted by the deadlines in the RD Schedule or RA Schedule described below in Section 8, as applicable. DEQ shall submit all deliverables to EPA in electronic form to the EPA contacts listed in Paragraph 113 of the CD. Copies of all deliverables will be transmitted concurrently to SDs' Project Coordinator at the time of submittal to EPA. SDs may provide comment to EPA and DEQ on any deliverable, and DEQ will incorporate or attempt to resolve all comments submitted by SDs that are timely received. Technical specifications for sampling and monitoring data and spatial data are addressed in ¶ 6.4. All other deliverables shall be submitted to EPA in the electronic form specified by the EPA RPM. If any deliverable includes maps, drawings, or other exhibits that are larger than 11.5" by 17" DEQ shall also provide EPA and SDs with paper copies of such exhibits.

### **6.4 Technical Specifications**

- (a) Sampling and monitoring data should be submitted in the most recent or the current at the time of generation standard U.S. EPA Region 8 Electronic Data Deliverable (EDD) format. Other delivery methods may be allowed if electronic direct submission presents a significant burden or as technology changes.
- (b) Spatial data, including spatially-referenced data and geospatial data, should be submitted:
  - (1) In the ESRI File Geodatabase format; and
  - (2) As unprojected geographic coordinates in decimal degree format using North American Datum 1983 (NAD83) or World Geodetic System 1984 (WGS84) as the datum. If applicable, submissions should include the collection method(s). Projected coordinates may optionally be included but must be documented. Spatial data should be accompanied by metadata, and such metadata should be compliant with the Federal Geographic Data Committee (FGDC) Content Standard for Digital Geospatial Metadata and its EPA profile, the EPA Geospatial Metadata Technical Specification. An add-on metadata



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

editor for ESRI software, the EPA Metadata Editor (EME), complies with these FGDC and EPA metadata requirements and is available at <https://www.epa.gov/geospatial/epa-metadata-editor>.

- (c) Each file must include an attribute name for each site unit or sub-unit submitted. Consult <https://www.epa.gov/geospatial/geospatial-policies-and-standards> for any further available guidance on attribute identification and naming.
- (d) Spatial data submitted by DEQ does not, and is not intended to, define the boundaries of the Butte Site.

## 6.5 Certification

All deliverables that require compliance with this ¶ 6.5 (i.e., that must be Certified) must be signed by the DEQ's Project Coordinator, or other responsible official of DEQ, and must contain the following statement:

I certify under penalty of law that this document and all attachments were prepared in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or who are directly responsible for authoring the relevant document, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate and complete. I am aware that there are significant penalties for submitting false information.

## 6.6 Approval of Deliverables

### (a) Initial Submissions

- (1) After review of any deliverable that is required to be submitted for EPA approval under the CD or the Outline, EPA shall:
  - (i) Approve, in whole or in part, the submission;
  - (ii) Approve the submission upon specified conditions;
  - (iii) Disapprove, in whole or in part, the submission; or
  - (iv) Any combination of the foregoing.
- (2) EPA also may modify the initial submission to cure deficiencies in the submission if:
  - (i) EPA determines that disapproving the submission and awaiting a resubmission would cause substantial disruption to the BTC Riparian Actions; or
  - (ii) Previous submission(s) have been disapproved due to material defects and the deficiencies in the initial submission under consideration indicate a bad faith lack of effort to submit an acceptable deliverable.

- (b) **Resubmissions.** Upon receipt of a notice of disapproval under ¶ 6.6. (Initial Submissions), or if required by a notice of approval upon specified conditions under ¶ 6.6, DEQ shall, within 30 days or such longer time as specified by EPA in such notice, correct the deficiencies and resubmit the deliverable for approval. After review of the resubmitted deliverable, EPA may:

- (1) Approve, in whole or in part, the resubmission;



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- (2) Approve the resubmission upon specified conditions;
  - (3) Modify the resubmission;
  - (4) Disapprove, in whole or in part, the resubmission, requiring DEQ to correct the deficiencies; or
  - (5) Any combination of the foregoing.
- (c) **Implementation.** Upon approval, approval upon conditions, or modification by EPA under ¶ 6.6(a) (Initial Submissions) or ¶6.6(b) (Resubmissions), of any deliverable, or any portion thereof:
- (1) Such deliverable, or portion thereof, will be incorporated into and enforceable under the CD; and
  - (2) DEQ shall take any action required by such deliverable, or portion thereof.
- (d) **Dispute Resolution.** Disputes concerning any EPA approval, modification, or disapproval under this Section between EPA and DEQ are subject to the dispute resolution procedures as provided for in the Butte Site SMOA. Disputes concerning EPA approval, modification, or disapproval under this Section as between EPA, DEQ, and SDs are subject to the dispute resolution provisions of the Consent Decree found at Paragraphs 72 through 75. SDs right to seek review through the dispute resolution provisions of the CD found at CD Paragraphs 72 through 75 only apply to Paragraphs 3.8 (Final (100%) RDs), 4.1 (RA Work Plans), 4.6 (RA Completion), and 4.7 (Certification of BTC Riparian Actions Completion) of this Appendix H.

## 6.7 Supporting Deliverables

DEQ shall submit each of the following supporting deliverables for EPA approval except as specifically provided. DEQ shall develop the deliverables in accordance with all applicable regulations, guidances, and policies (see Section 9 (References)). DEQ shall update each of these supporting deliverables as necessary or appropriate during the course of the BTC Riparian Actions, and/or as requested by EPA.

- (a) **BTC Area Health and Safety Plan.** The BTC Area Health and Safety Plan (BTC HASP) describes all activities to be performed to protect on site personnel and area residents from physical, chemical, and all other hazards posed by the BTC Riparian Actions. DEQ shall develop the BTC HASP in accordance with EPA's Emergency Responder Health and Safety and Occupational Safety and Health Administration (OSHA) requirements under 29 C.F.R. §§ 1910 and 1926. The HASP should cover RD activities and should be, as appropriate, updated to cover activities during the RA and updated to cover activities after RA completion. EPA does **not** approve the BTC HASP, but will review it to ensure that all necessary elements are included and that the plan provides for the protection of human health and the environment.
- (b) **BTC Area Emergency Response Plan.** The BTC Area Emergency Response Plan (BTC ERP) must describe procedures to be used in the event of an accident or emergency at the BTC Area (for example, power outages, water



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

impoundment failure, treatment plant failure, slope failure, etc.). The BTC ERP must include:

- (1) Name of the person or entity responsible for responding in the event of an emergency incident;
- (2) Plan and date(s) for meeting(s) with the local community, including local, State, and federal agencies involved in the cleanup, as well as local emergency squads and hospitals;
- (3) Spill Prevention, Control, and Countermeasures (SPCC) Plan (if applicable), consistent with the regulations under 40 C.F.R. Part 112, describing measures to prevent, and contingency plans for, spills and discharges;
- (4) Notification activities in accordance with ¶ 4.4(b) (Release Reporting) in the event of a release of hazardous substances requiring reporting under Section 103 of CERCLA, 42 U.S.C. § 9603, or Section 304 of the Emergency Planning and Community Right-to-know Act (EPCRA), 42 U.S.C. § 11004; and
- (5) A description of all necessary actions to ensure compliance with Paragraph 36 (Emergencies and Releases) of the CD in the event of an occurrence during the performance of the BTC Riparian Actions that causes or threatens a release of Waste Material from the BTC Area that constitutes an emergency or may present an immediate threat to public health or welfare or the environment.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**7.0 SETTling DEFENDANTS' PARTICIPATION**

**7.1 Copies**

DEQ shall, at any time it submits a deliverable to EPA, simultaneously send a copy of such deliverable to SDs. EPA shall, at any time it sends a notice, authorization, approval, disapproval, comments, or certification to DEQ, send a copy of such document to SDs.

**7.2 Review and Comment by SDs**

For any deliverable submitted by DEQ to EPA under the CD or this Appendix H (and simultaneously provided to SDs), SDs may review and timely provide comments to EPA and DEQ. DEQ shall incorporate and attempt to resolve all comments timely submitted by SDs and shall notify SDs of the disposition of comments prior to completing or revising the deliverable.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

**8.0 SCHEDULES**

**8.1 Applicability and Revisions**

All deliverables and tasks required under this Outline must be submitted or completed by the deadlines or within the time durations listed in the RD and RA Schedules set forth below. DEQ may submit proposed revised RD Schedules or RA Schedules for EPA approval. Upon EPA's approval, the revised RD and/or RA Schedules supersede the RD and RA Schedules set forth below, and any previously-approved RD and/or RA Schedules.

**8.2 RD Schedule for the Further Remedial Elements**

RD and RA Schedules for the BTC Riparian Actions shown in Exhibit 1 to the BPSOU SOW.



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

## 9.0 REFERENCES

### 9.1 Regulations and Guidance Documents

The following regulations and guidance documents, among others, apply to the activities. Any item for which a specific URL is not provided below is available on one of the two EPA Web pages listed in ¶8.1(y):

- (a) A Compendium of Superfund Field Operations Methods, OSWER 9355.0-14, EPA/540/P-87/001a (Aug. 1987).
- (b) CERCLA Compliance with Other Laws Manual, Part I: Interim Final, OSWER 9234.1-01, EPA/540/G-89/006 (Aug. 1988).
- (c) CERCLA Compliance with Other Laws Manual, Part II, OSWER 9234.1-02, EPA/540/G-89/009 (Aug. 1989).
- (d) Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties, OSWER 9355.5-01, EPA/540/G-90/001 (Apr. 1990).
- (e) Guidance on Expediting Remedial Design and Remedial Actions, OSWER 9355.5-02, EPA/540/G-90/006 (Aug. 1990).
- (f) Guide to Management of Investigation-Derived Wastes, OSWER 9345.3-03FS (Jan. 1992).
- (g) Permits and Permit Equivalency Processes for CERCLA On-Site Response Actions, OSWER 9355.7-03 (Feb. 1992).
- (h) Guidance for Conducting Treatability Studies under CERCLA, OSWER 9380.3-10, EPA/540/R-92/071A (Nov. 1992).
- (i) National Oil and Hazardous Substances Pollution Contingency Plan; Final Rule, 40 C.F.R. Part 300 (Oct. 1994).
- (j) Guidance for Scoping the Remedial Design, OSWER 9355.0-43, EPA/540/R-95/025 (Mar. 1995).
- (k) Remedial Design/Remedial Action Handbook, OSWER 9355.0-04B, EPA/540/R-95/059 (June 1995).
- (l) EPA Guidance for Data Quality Assessment, Practical Methods for Data Analysis, QA/G-9, EPA/600/R-96/084 (July 2000).
- (m) Guidance for Quality Assurance Project Plans, QA/G-5, EPA/240/R-02/009 (Dec. 2002).
- (n) Quality management systems for environmental information and technology programs -- Requirements with guidance for use, ASQ/ANSI E4:2014 (American Society for Quality, February 2014).
- (o) Uniform Federal Policy for Quality Assurance Project Plans, Parts 1-3, EPA/505/B-04/900A through 900C (Mar. 2005).
- (p) Superfund Community Involvement Handbook, SEMS 100000070 (January 2016), <https://www.epa.gov/superfund/community-involvement-tools-and-resources>.
- (q) EPA Guidance on Systematic Planning Using the Data Quality Objectives Process, QA/G-4, EPA/240/B-06/001 (Feb. 2006).
- (r) EPA Requirements for Quality Assurance Project Plans, QA/R-5, EPA/240/B-01/003 (Mar. 2001, reissued May 2006).



Consent Decree for the Butte Priority Soils Operable Unit  
Partial Remedial Design/Remedial Action and Operation and Maintenance

- (s) EPA Requirements for Quality Management Plans, QA/R-2, EPA/240/B-01/002 (Mar. 2001, reissued May 2006).
- (t) EPA National Geospatial Data Policy, CIO Policy Transmittal 05-002 (Aug. 2008), <https://www.epa.gov/geospatial/geospatial-policies-and-standards> and <https://www.epa.gov/geospatial/epa-national-geospatial-data-policy>.
- (u) Principles for Greener Cleanups (Aug. 2009), <https://www.epa.gov/greenercleanups/epa-principles-greener-cleanups>.
- (v) Construction Specifications Institute's Master Format, available from <https://www.csiresources.org/home>.
- (w) EPA's Emergency Responder Health and Safety Manual, OSWER 9285.3-12 (July 2005 and updates), <https://www.epaossc.org/HealthSafetyManual/manual-index.htm>.
- (x) Broader Application of Remedial Design and Remedial Action Pilot Project Lessons Learned, OSWER 9200.2-129 (Feb. 2013).

## 9.2 EPA Web Pages

A more complete list may be found on the following EPA Web pages:

- (a) Laws, Policy, and Guidance: <https://www.epa.gov/superfund/superfund-policy-guidance-and-laws>
- (b) Test Methods Collections: <https://www.epa.gov/measurements/collection-methods>

## 9.3 Other Regulations and Guidance

For any regulation or guidance referenced in the CD or this Outline, the reference will be read to include any subsequent modification, amendment, or replacement of such regulation or guidance. Such modifications, amendments, or replacements apply to the BTC Riparian Actions only after DEQ receives notification from EPA of the modification, amendment, or replacement.



# EXHIBIT 1 TO APPENDIX H

## TO THE BUTTE PRIORITY SOILS CONSENT DECREE

### COST DETERMINATION FOR LOAD, HAUL, AND DUMP OF BLACKTAIL CREEK WASTE MATERIALS

This Exhibit 1 to Appendix H (Cost Determination) describes the methodology and assumptions used to calculate a baseline unit rate to load, transport, and deposit Waste Materials removed in the BTC Riparian Actions (BTC Waste Materials) at a repository location approved by EPA, in consultation with DEQ. If more than one repository location is approved by EPA, DEQ shall select which approved repository shall be utilized for deposit of BTC Waste Materials.

DEQ and Atlantic Richfield agree that the Baseline Unit Rate ( $B_r$ ) is calculated using the Key Assumptions and Variables from Table 1 described in this Exhibit 1, utilizing data exchanged in April 2020. The State and AR memorialized the agreed-upon  $B_r$  by letter dated May 13, 2020. The Baseline Unit Rate will not change for purposes of determining the Calculated Reimbursement Amount described in Paragraph 20.g of the Consent Decree. To protect the integrity of DEQ's bidding process and consistent with DEQ's procurement practices, the agreed to  $B_r$  value will be disclosed after the bid process is complete and the related contracts have been awarded.

Should the actual contract unit rate (submitted by the successful bidder for the work) exceed the baseline unit rate, AR shall reimburse DEQ for excess costs that DEQ incurs to load, transport, supply all necessary off-site traffic control and deposit up to 240,000 loose cubic yards (LCY) of BTC Waste Materials at the approved waste repository location selected by DEQ for deposit of removed BTC Waste Materials.

The Calculated Reimbursement Amount ( $A_{mt}$ ) required under Consent Decree Subparagraph 20.g shall equal the actual LCY volume ( $V$ ) of BTC Waste Materials that DEQ transports to and deposits at the approved repository selected by DEQ for that waste, multiplied by the difference between the Baseline Unit Rate ( $B_r$ ) and the actual Contract Unit Rate ( $C_r$ ) provided by the lowest responsible and responsive bidder:

$$A_{mt} = V \times (C_r - B_r)$$

To calculate the reimbursement amount, DEQ shall require the bid item for loading, transporting traffic control, and depositing BTC Waste Materials at the approved waste repository(s) to include a unit rate defined in dollars per LCY (\$/LCY). DEQ shall also provide an estimated volume of BTC Waste Materials as part of the bid.

The Contract Unit Rate shall be limited to all costs required to perform the following activities:



- Loading BTC Waste Materials from a stockpile at the BTC Riparian Actions project site (BTC Stockpile) onto a street-legal haul truck;
- Transporting BTC Waste Materials by street-legal haul trucks from the BTC Stockpile to the approved repository selected by DEQ for BTC Waste Materials, using the transportation route that EPA approves, in consultation with DEQ;
- Providing necessary traffic control along the transportation route for BTC Waste Materials;
- Depositing BTC Waste Materials at a designated deposit location at the approved repository selected by DEQ and no DEQ management will be required at the designated repository; and
- Returning the empty truck from the repository site to the BTC Riparian Actions site.

The bid item and Contract Unit Rate shall not include any other project costs or activities, including:

- BTC Waste Materials excavation activities, including, but not limited to, on-site stockpiling, BTC Riparian Area site road construction, dust control and stormwater management, and dewatering / management of construction water at the BTC Riparian Actions site;
- Incidental costs, including but not limited to mobilization, supervision, facilities, or demobilization; or
- Costs for activities that Atlantic Richfield is required to complete, including: the design, construction, management, operation, maintenance, repair and closure of the approved repository for BTC Waste Materials; maintenance, repair and dust control on the approved transportation route between the BTC Riparian Actions site and the approved waste repository; and management of BTC Waste Materials after they are deposited at the approved repository.

### **Methodology**

This Cost Determination uses standard heavy-equipment construction cost estimation practices to determine a baseline per cubic yard rate for loading, transporting and depositing stockpiled common earth. The calculation incorporates common variables including swell factor, equipment cycle-time, equipment production rates, equipment rental rates, equipment operator rates, round-trip haul distance, truck speed, and wait time.



### Key Assumptions and Variables

Table 1 provides the key assumptions and variables used to complete the Cost Determination.

Table 1. Key Assumptions and Variables

<b>Assumption/Variable</b>	<b>Range</b>
Round-Trip Haul Distance	2.90 – 3.50 miles
Travel Speed (Asphalt)	20 mph
Travel Speed (Gravel)	15 mph
Swell Factor	20%
Load/Dump Time	15 minutes
Wait Time	0 minutes
Cycle Time	23.7 – 30.5 minutes
Working Hours/Day	8 hours
Working Days/Year	230 days

### References

Caterpillar Performance Handbook 46, 2016

Equipment Watch – Cost Reference Guide for Construction Equipment, 2020

Gordian Heavy Construction Costs with RSMeans Data, 33<sup>rd</sup> Ed., 2019